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### THE CONCENTRATION OF HÆMOGLOBIN IN THE BLOOD OF NORMAL MEN.

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WHEN Haldane (1898, 1900) developed the ferricyanide method for determining the oxygen combining power of hæmoglobin, he made a contribution to methods of blood chemistry the importance of which can hardly be overestimated. He made available a convenient and accurate method, which is still used for the standardization of other methods for determining hæmoglobin in blood. Modifications of the method which have been introduced (Barcroft and Haldane, 1902; Barcroft and Roberts, 1910; Haldane, 1921; Van Slyke and Neill, 1924) have been concerned with its application to quantities of blood smaller than that used in Haldane's original method.

When a year or so later Haldane (1901) introduced his colorimetric method for determining the hæmoglobin of blood as carbon monoxide hæmoglobin, he made another major contribution to the methods of blood chemistry. He placed in the hands of hæmatologists a simple and rapid method, which has been of enormous service to them and in spite of much criticism still survives. Although a survey of the literature makes obvious the fact that this method is outmoded, nothing can detract from the value of the service which it has rendered.

In 1900 Haldane and Smith published the results of determinations by this method of the oxygen capacity of the blood of 12 "normal individuals, nearly all of whom were students or practitioners of medicine working in the laboratory". The work was done in Belfast. An average figure of 18.5 millilitres of oxygen at normal temperature

and pressure per 100 millilitres of blood was obtained. "For greater certainty that this average is sufficiently correct", Haldane "made a further set of determinations on perfectly normal men" at Oxford a year later. Twelve men, ranging in age from sixteen to sixty-two years, were examined. The average figure for the oxygen capacity of their blood was again found to be 18.5 millilitres per 100 millilitres. The range of the 24 observations was from 16.4 to 20.9 millilitres per 100 millilitres.

On the basis of these figures Haldane recommended that male human blood having an oxygen capacity of 18.5 millilitres per 100 millilitres should be taken as the standard of comparison, and that oxygen capacity (or hæmoglobin content) should be expressed as a percentage of this normal figure, which would thus be given the value 100. In publishing these results and recommendations Haldane made a contribution to hæmatology which has proved to be of very different value from his contributions in the field of methods of determination. His contributions to other aspects of blood chemistry have been so great as to have given to his opinion on standard values for hæmoglobin in blood a weight which the data on which the opinion is based do not justify.

The confusion of standards for hæmoglobin content in blood has already been pointed out by many authors. A useful recent survey of the question is that given in a paper by Myers and Eddy (1939). It is not proposed to discuss this question further, except to point out that in spite of the different standards recommended by different investigators the resulting confusion would have been largely avoided if values had been expressed as grammes of hæmoglobin per 100 mls of blood, rather than as percentages of somewhat arbitrary standard values.

Investigations of the hæmoglobin content of the blood of normal males carried out during the last ten years show, practically without exception, average values considerably higher than Haldane's. This statement refers, of course, to comparable localities, in which the heights above sea level have not been great enough to show the

well-known effect of this factor in raising the hæmoglobin content of the blood. Surveys such as that of Myers and Eddy (*loco citato*), to which access may be had for further reference, restrict their consideration to the average values and ranges found by different investigators. Indeed many investigators, including Myers and Eddy, give no information on individual results. No general survey seems to have been made of the distribution of the individual determinations of different investigators.

It will therefore be of interest to examine this distribution, especially with regard to its relation to figures obtained from recent determinations on comparable Australian subjects. The examination is restricted to normal adult males to exclude variations due to sex and age. The effect of these factors will, however, be indicated briefly.

#### Effect of Sex.

There is general agreement that the hæmoglobin content of the blood of women is lower than that of men. Table I gives representative figures which clearly show this fact.

TABLE I.

Average Hæmoglobin Content of the Blood of Human Adults of Both Sexes

Authors.	Date.	Average Hæmoglobin Content. (Grammes per 100 Millilitres of Blood.)		
		Men.	Women.	Women Men $\times 100$
Brown and Briggs ..	1933	16.53	14.02	85
Gram and Norgaard ..	1923	15.05	13.5	90
Haden ..	1923	15.53	13.34	86
Jenkins and Don ..	1923	15.85	13.75	87
Osgood ..	1935	15.84	13.8	87
Price-Jones ..	1931	14.54	13.56	93
Sachs and Levine ..	1933	14.94	12.74	85
Sankaran and Rajagopal ..	1938	16.57	13.73	83
Sokhey and Ockhale ..	1938	15.37	14.10	92
Villela and Rodrigues ..	1935	16.35	14.5	89
Wintrobe ..	1933	16.0	13.9	87
Mean ..	..	15.70	13.65	87

The figures in Table I show that a number of investigators in several different countries have obtained values indicating that the average hæmoglobin content of women's blood is 87% of that of men's blood. The range of variation shown by these figures is approximately  $\pm 5\%$ .

#### Effect of Age.

Information on the effect of age is not so plentiful. Many years ago Breinl and Priestley (1914) showed that the average hæmoglobin content of boys' blood remained approximately constant between the ages of seven and twelve years and then began rapidly to rise up to the age of sixteen years, beyond which the investigation did not extend. The hæmoglobin content of girls' blood also rose between the ages of seven and sixteen years. Although there is some indication that this rise occurred in two phases, they are not so sharply differentiated as in the boys. Osgood (1935) found a similar relation between age and the hæmoglobin content of children's blood. No tendency in one direction is to be seen in his figures for ages from four to twelve years. At the latter age a sharp rise appears which continues until adult values are reached at about the age of fourteen years. In Osgood's figures for children no clear distinction can be seen between the sexes. It first appears during the rise towards the adult value. This is reached sooner by the girls, and is only about half as great as the rise shown by the boys. The average figure common to the two sexes in childhood is about 12.0 grammes of hæmoglobin per 100 millilitres of blood. This figure is close to that found by Breinl and Priestley (*loco citato*); but their figures do not show as great a rise as do Osgood's between the ages of twelve and fifteen years.

#### Material Examined.

In the present consideration of the figure for hæmoglobin content of the blood of normal adult males, 1,512 have been examined. The age of the subjects ranged from fourteen to fifty years, but the great majority were between the ages of twenty and thirty years. The material is thus homogeneous with regard to sex. It is within a range of age in which this factor has not been shown to have any definite influence on the hæmoglobin content of human blood.

The material is heterogeneous with regard to race. The great majority of the subjects were European or of European descent, 246 were Indian and 19 were Brazilian of unspecified racial origin, but presumably mainly European. The information at present available does not indicate the existence of any effect of race, as distinct from other factors, on the level of hæmoglobin in human blood.

The material examined is also heterogeneous with regard to locality. It includes the results of sixteen independent investigations carried out in eight different countries in latitudes ranging from 55° north to 33° south, and longitudes ranging from 151° east to 106° west. Three of the investigations were carried out in the tropics. With the exception of those carried out at Omaha, Nebraska, and at Portland, Oregon, which are about 1,000 feet above sea level, the investigations were carried out at heights below 500 feet above sea level. The results are therefore sufficiently homogeneous with respect to the possible effect of altitude on the figures obtained for the hæmoglobin content of the blood examined.

The great majority of the subjects examined were students or members of staffs of medical schools. About 200 "normal males" of unspecified occupation and twenty soldiers are included in the total number examined. The material is therefore reasonably homogeneous with regard to the occupation of the subjects.

#### Methods.

Several different methods were used by the investigators whose results are under consideration. These methods can be placed in two groups: (i) Direct chemical determinations (a) of the oxygen capacity of the blood by the ferricyanide method, the factor 0.746 being used to convert millilitres of oxygen to grammes of hæmoglobin per 100 millilitres of blood (1.34 millilitres of oxygen at normal temperature and pressure equal one gramme of hæmoglobin), or (b) of the iron content of a known volume of blood, by means of the relation 0.00335 gramme of iron equals one gramme of hæmoglobin. Of the total number of determinations, 660 were made by these direct methods. (ii) Indirect methods depending on colorimetric determinations of some derivative of hæmoglobin. All the determinations thus made, except one group, were standardized by comparison with one of the above direct methods. The exception was a group of measurements made by the spectrophotometer, the standard of reference being a solution of crystallized hæmoglobin of known content. Of the rest, 692 were made by some modifications of the Sahli acid hæmatin method, an artificial coloured standard being used. One investigator used the Haldane carbon monoxide method for 120 determinations. The results of one group of these determinations are distinctly lower than those of any other group in the series.

The results of tests on the Australian students were obtained by the Newcomer (1919) modification of the Sahli method. The standard glass disk used was of German manufacture. The figures obtained with this disk, with the use of the conversion table supplied with it, and the corresponding figures obtained by the ferricyanide oxygen capacity method (Haldane) are shown in Table II.

The mean ratio of the figure for grammes of hæmoglobin per 100 millilitres of blood obtained by the oxygen capacity method to that obtained colorimetrically is 0.794. Another standard glass disk of the same origin obtained subsequently (but not used in this investigation) gave figures which corresponded closely with those obtained by the oxygen capacity method when used with the same con-

TABLE II.  
Standardization of Acid Hamatin Colorimetric Values Against Oxygen Capacity.

Source of Blood.	Colorimetric Reading.	Hæmoglobin. (Grammes per 100 Millilitres of Blood.)		O-capacity <sup>1</sup> Colorimetric Value.
		Colorimetric Value.	O-capacity. <sup>1</sup>	
Horse I.	7.8	16.2	13.2	0.795
	7.6	16.7	13.2	
	7.6	16.7	13.0	
Mean .. ..		16.5	13.1	
Horse II.	7.7	16.5	13.1	0.798
	7.8	16.2	13.0	
Mean .. ..		16.4	13.1	

<sup>1</sup> O-capacity = oxygen capacity.

version table supplied with it. The above ratio is close to that between hæmoglobin values expressed on the Sahli scale (17.5 grammes per 100 millilitres equal 100%) and values expressed on the Haldane scale (13.8 grammes per 100 millilitres equal 100%) ( $13.8 \div 17.5 = 0.789$ ). The ratio between the thickness of glass of the two standard disks was also close to the same value: 1.308 millimetres/1.659 millimetres = 0.788. Possibly by error the appropriate conversion table was not supplied with the first standard disk, but there was no information either on the disks or on the tables to show which were intended to be used together.

These facts are recorded as typical indications of the confusion existing among hæmoglobin standards intended for clinical use, even when these are of the same origin. The facts show the necessity for checking colorimetric standards before use. They also indicate the necessity for having the standards, and any conversion tables supplied with them, clearly marked to indicate their values in grammes of hæmoglobin per 100 millilitres of blood. This confusion has not been found with Newcomer standard disks and their tables, of American manufacture.

#### Results.

The material examined falls into two groups. One is that obtained by a survey of the pertinent literature from which individual determinations on normal adult males can be obtained. Although no claim of completeness is made, this survey is believed to include the literature accessible in Sydney. The other group consists of determinations made upon 77 students and members of the medical school staff in Sydney, and upon 25 adult male aborigines in Central Australia, whose ages are not known but among whom old men are not included. A few of these results have been published in another connexion (Wardlaw, Barry *et alii*, 1935); the remainder were made in connexion with the present investigation. These results have been considered separately as and also part of the general survey. The individual results for these groups are shown in Tables III and IV.

TABLE IV.  
Concentration of Hæmoglobin (Grammes per 100 Millilitres) in Blood of Adult Male Aborigines. (Ages Unknown, but Old Men Excluded.)

Subject.	Hæmoglobin.	Subject.	Hæmoglobin.
Imb .. ..	14.4	Nur .. ..	14.3
Pam .. ..	15.1	Nan .. ..	15.8
Alb .. ..	15.1	Fre .. ..	15.5
Gus .. ..	15.1	Jer .. ..	13.7
Eno .. ..	14.9	Har .. ..	15.1
Pet .. ..	14.9	Ter .. ..	14.6
Wur .. ..	16.1	Ind .. ..	14.9
Huk .. ..	14.7	Nar .. ..	15.0
Lau .. ..	18.2	Joe .. ..	15.3
Ale .. ..	14.1	Kus .. ..	15.3
San .. ..	16.4	War .. ..	16.8
Men .. ..	15.0	Sim .. ..	15.0

Mean: 15.2.

TABLE III.

Hæmoglobin Content of Blood of Normal White Males in Sydney in Grammes per 100 Millilitres. The subjects, were Aged between 19 and 28 Years, with Two Exceptions, Aged 40 and 44 Years.

Subject.	Hæmoglobin. (Grammes.)	Subject.	Hæmoglobin. (Grammes.)
Ba. .. ..	15.1	Ea. .. ..	14.1
Jo. .. ..	15.7	Da. .. ..	14.6
Wa. .. ..	14.4	Ed. .. ..	15.1
Da. .. ..	15.0	Pl. .. ..	16.0
Jo. .. ..	15.7	Mc. .. ..	15.4
De. .. ..	15.6	Br. .. ..	16.1
Th. .. ..	15.3	Ha. .. ..	16.1
Ue. .. ..	16.4	Ry. .. ..	15.0
Le. .. ..	16.5	Cr. .. ..	17.8
Bo. .. ..	16.7	El. .. ..	18.6
Br. .. ..	13.7	Co. .. ..	15.9
As. .. ..	16.6	Da. .. ..	15.5
Mo. .. ..	16.6	Ro. .. ..	17.1
1 .. ..	18.9	27 .. ..	16.5
2 .. ..	17.8	28 .. ..	17.5
3 .. ..	16.8	29 .. ..	17.6
4 .. ..	17.8	30 .. ..	17.2
5 .. ..	16.1	31 .. ..	15.8
6 .. ..	16.8	32 .. ..	16.5
7 .. ..	17.5	33 .. ..	15.8
8 .. ..	14.6	34 .. ..	16.3
9 .. ..	17.2	35 .. ..	16.1
10 .. ..	16.8	36 .. ..	15.1
11 .. ..	17.7	37 .. ..	16.1
12 .. ..	16.4	38 .. ..	15.8
13 .. ..	15.8	39 .. ..	15.8
14 .. ..	15.8	40 .. ..	16.3
15 .. ..	15.7	41 .. ..	15.8
16 .. ..	15.8	42 .. ..	16.8
17 .. ..	15.3	43 .. ..	16.3
18 .. ..	15.8	44 .. ..	16.1
19 .. ..	15.8	45 .. ..	16.5
20 .. ..	16.3	46 .. ..	15.4
21 .. ..	16.1	47 .. ..	13.4
22 .. ..	16.9	48 .. ..	15.6
23 .. ..	16.8	49 .. ..	16.9
24 .. ..	15.3	50 .. ..	16.8
25 .. ..	18.2	51 .. ..	18.9
26 .. ..	17.8		

Mean: 16.2.

The figures in Table III have a mean value of 16.2 grammes of hæmoglobin per 100 millilitres of blood, and a range from 13.4 to 18.9 grammes.

The figures for the aborigines in Table IV have a mean value of 15.2 grammes of hæmoglobin per 100 millilitres of blood. They range from 13.7 to 18.2 grammes.

The mean and the extreme values of the collected results, including the above figures, are shown in Table V.

The figures in Table V show that the extreme range of the hæmoglobin content of the blood of these 1,512 normal males was from 11.95 to 20.3 grammes per 100 millilitres. The mean figures for the various groups ranged from 14.54 to 16.57 grammes per 100 millilitres. Only one group shows a mean below 15.0 grammes per 100 millilitres of blood. The Sydney mean is among five groups which have values above 16.0 grammes per 100 millilitres. The mean of all the individual results is 15.57 grammes per 100 millilitres.

#### Discussion.

The distribution of the individual results over the range of variation was examined as follows. They were arranged in cumulative tables (Table VI) showing the numbers at and below certain values of hæmoglobin concentration in the blood, starting at the lowest whole number necessary and increasing by steps of 0.5 gramme.

From the cumulative tables graphs were drawn having hæmoglobin values as abscissæ and numbers of results as ordinates. Smooth curves drawn through the points so plotted would give the ogival curves of Galton, to whom this simple method of statistical examination is due. The data for the Sydney and the collected results differ widely in numbers. To enable both to be plotted to the same scale they have been expressed as percentages of the total numbers. In the Sydney results only the figures for white subjects have been plotted.

Frequency curves have been plotted as derived graphs from the cumulative graphs, rather than directly, for two reasons: (1) Cumulative graphs can easily be plotted to the same scale if numbers of results are expressed as fractions



TABLE V.  
Hæmoglobin Concentration in Blood of Normal Men. (Grammes per 100 Millilitres.)

Authors.	Date.	Place.	Method.	Class of Subject.	Age. (Years.)	Number Examined.	Maximum.	Minimum.	Mean.
Broun and Briggs ..	1933	St. Louis (Mo.).	O <sub>2</sub> capacity (Van Slyke).	Students.	20 to 43	23	18.5	15.25	16.53
Fiddes and Witney	1936	Saskatoon (Sask.).	O <sub>2</sub> capacity (Haldane).	Normal men.	20 to 48	20	16.8	13.95	15.55
Foster and Johnson	1931	New Orleans (La.).	O <sub>2</sub> capacity (Van Slyke).	Students.		115	18.0	12.5	15.63
Gram and Norgaard	1923	Copenhagen, Denmark.	Acid hæmatin (glass wedge).	Hospital staff.	20 to 42	10	16.3	13.3	15.05
Haden .. ..	1923	Kansas City (Kan.).	O <sub>2</sub> capacity (Van Slyke).	Normal men.	18 to 50	40	17.7	13.8	15.53
Horneffer ..	1928	Glessen, Germany.	Spectrophotometer.	Students and soldiers.	19 to 27	40	18.0	14.4	16.08
Jenkins and Don ..	1933	English towns.	O <sub>2</sub> capacity (Van Slyke).	Normal men.	20 to 50	118	18.35	13.95	15.85
Osgood .. ..	1935	Portland (Ore.).	Acid hæmatin (Osgood).	Students.	14 to 30	239	18.0	14.0	15.84
Price-Jones ..	1931	London.	CO-Hb. (Haldane).	Students and staff.	20 to 43	100	17.1	12.5	14.54
Price-Jones ..	1931	Boston (Mass.).	CO-Hb. (Haldane).	Students.	20	20	17.2	13.8	15.40
Sachs, Levine <i>et alii</i>	1933, 1935	Omaha (Neb.).	Fe (Wong).	Students.	20 to 25	200	16.95	11.95	15.00
Sankaran and Rajagopal.	1938	Madras, India.	Fe (Wu).	Students.	18 to 25	125	20.3	12.2	16.57
Sokhey, Gokhale <i>et alii</i>	1937	Bombay, India.	Acid hæmatin (Newcomer).	Students.	20 to 30	121	17.9	12.8	15.37
Villela and Rodrigues	1935	Rio de Janeiro, Brazil.	Fe (Wong).	Normal men.	18 to 28	19	18.6	14.5	16.35
Walters .. ..	1933	Lawrence (Kan.).	Acid hæmatin (Newcomer).	Students.	20 to 30	100	18.7	12.9	15.12
Wardlaw, Barry <i>et alii</i> .	1935, 1941	Sydney, N.S.W.	Acid hæmatin (Newcomer).	Students and staff.	20 to 45	77	18.9	13.4	16.20
Wardlaw, Barry <i>et alii</i> .	1935	Hermannsburg (C.A.).	Acid hæmatin (Newcomer).	Aborigines.		25	18.2	12.5	15.12
Wintrobe and Miller	1929	Baltimore (Md.).	Acid hæmatin (Newcomer).	Students.	19 to 30	100	17.85	13.5	15.87
Range and weighted mean .. ..					14 to 50	1,512	20.3	11.95	15.57

TABLE VI.  
Cumulative Table of Hæmoglobin Values.

Hæmoglobin. (Grammes per 100 Millilitre.)	Results at and Below Value.			
	Sydney.		Collected.	
	Number.	Percentage.	Number.	Percentage.
12.0			4	0.3
12.5			10	0.7
13.0			27	1.8
13.5	1	1.3	70	4.6
14.0	3	3.9	176	11.6
14.5	7	9.1	356	23.5
15.0	12	15.6	564	37.3
15.5	18	23.4	807	53.4
16.0	35	45.5	1,057	70.0
16.5	54	70.0	1,252	82.8
17.0	63	81.8	1,353	89.4
17.5	69	89.7	1,429	94.8
18.0	73	94.9	1,463	96.7
18.5	74	96.3	1,466	96.8
19.0	77	100.0	1,462	96.7
19.5			1,497	99.0
20.0			1,506	99.8
20.5			1,512	100.0

of the totals. To plot the frequency graphs directly to the same scale, this must be chosen to make the area between the graph and its abscissa the same in each case. This adjustment is rather difficult to make. (ii) In the drawing of the derived graphs, minor irregularities can be smoothed out with little arbitrary choice on the part of the observer.

The ordinates of the frequency curves are proportional to the differences of height between the ordinates of the cumulative graph corresponding to values of hæmoglobin which differ by one gramme—that is, to the average slope of the cumulative curve between these points. A point was plotted in this way for values of hæmoglobin increasing by one gramme steps and a curve was drawn through the points. In the frequency graph numbers of results are represented by areas. The total area between the graph and the abscissa lines is the same for each graph, as it represents 100% of the total number of results.

This approximate method of plotting the frequency graph enables the mode or most frequent value to be shown with an error not greater than  $\pm 0.1$  gramme of hæmoglobin.

The most frequent values, or modes, shown in Figure I, are 15.6 grammes per 100 millilitres for the collected results, and 16.1 grammes per 100 millilitres for the Sydney results. The medians or middle values are 15.1 and 16.1 grammes per 100 millilitres.

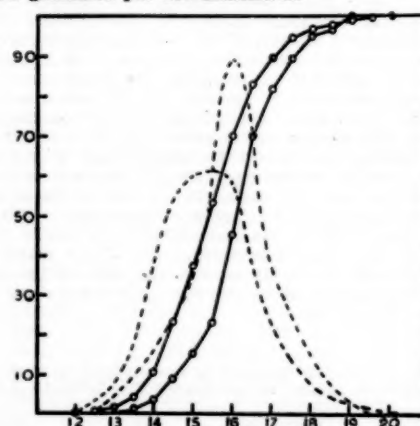


FIGURE I.

Abscissæ: grammes of hæmoglobin in 100 millilitres of blood. Ordinates: percentage of total number of results; ordinates refer only to cumulative curves. Cumulative graphs are shown by continuous lines, frequency curves by interrupted lines. The graphs for the Sydney results are to the right, those for the collected results to the left.

The three central values (mode, median and mean) for the smaller and more homogeneous group of results on Sydney subjects give no evidence of gross asymmetry in their distribution. The difference between the mean and



the other central values for the collected results, however, shows obvious asymmetry of distribution. The spread of the results in the collected series is also considerably the greater. This might have been expected from the variety of sources from which they were obtained and of methods by which they were determined. The ranges from the means are: for the collected results, +4.85 to -3.50; for the Sydney results, +2.7 to -2.8 grammes per 100 millilitres of blood.

The distribution shown by the graphs is better summarized by the so-called "probable error" on the average variation from the mean, outside of which the upper and lower 25% of the results (quartiles) are found. This value is 0.85 gramme for the collected and 0.55 for the Sydney figures. The standard deviation (square of mean of squares of deviations from mean) is now more usually employed as a measure of dispersion. It is, roughly, the average range of variation from the mean, outside of which the upper and lower sixths of the results lie. For the collected results the standard deviation is 1.29 grammes and for the Sydney results, 0.78 gramme. The figures for the central values and dispersion of these results are collected in Table VII.

TABLE VII.

Variation of Hæmoglobin Content of Normal Adult Male Human Blood.  
(Grammes per 100 Millilitres.)

	Collected Results (1,512).	Sydney Results (77).
Mean .. .. .	15.7	16.2
Mode .. .. .	15.6	16.1
Median .. .. .	15.4	16.1
Maximum .. .. .	20.9	18.9
Minimum .. .. .	11.95	13.4
Upper quartile .. .. .	16.2	16.65
Lower quartile .. .. .	14.5	15.55
"Probable error" .. .. .	0.85	0.55
Standard deviation .. .. .	1.29	0.78

The main conclusion to be drawn from this survey of the concentration of hæmoglobin of over 1,500 normal men is that the means of different groups show a surprisingly restricted variation in spite of the diversity of origin of subjects and of methods employed ( $15.57 \pm 1.0$  gramme per 100 millilitres of blood). The results give no indication that standards of hæmoglobin in blood need be different for different localities (apart from the effect of height). They suggest, on the other hand, that a standard figure within the range of the mean values of the various series of observations recorded would be satisfactory for the whole group. In particular, no evidence appears of any necessity for some special standard for Australia. The standard of 15.6 grammes per 100 millilitres of blood suggested by Haden in 1922 is very close indeed to the mean figure for the collected results. This standard is already extensively used, especially by American workers. It is a standard much closer to the average Australian figure than the commonly used 13.8 grammes per 100 millilitres or 100% on the Haldane scale. An argument which has been raised against any alteration of the standard which is at present customary here is that values of the colour index would be altered. If, however, this index were calculated as:

grammes of hæmoglobin per 100 ml. blood

red cell count in millions  $\times 3$

a normal hæmoglobin value would give an index for males close to one.

#### Summary.

The mean concentration of hæmoglobin found in the blood of 1,512 normal men by 17 investigators in eight countries was 15.7 grammes per 100 millilitres of blood.

The most frequent value was 15.6 grammes per 100 millilitres. Only one investigator found a mean figure below 15.0 grammes.

The mean and the most frequent values for a group of Sydney students were 16.2 and 16.1 grammes.

The results do not indicate the need for any special standard for Australia.

It is suggested that the commonly used standard of 15.5 grammes per 100 millilitres (Haden) is more suitable than that of Haldane (13.8 grammes per 100 millilitres = 100%).

The necessity for checking colorimetric standards and the desirability of expressing results as grammes of hæmoglobin rather than as percentages of a standard figure are emphasized.

The mean concentration of hæmoglobin in the blood of normal women was found by 11 investigators in eight countries to be  $87(\pm 5)\%$  of that of normal men.

#### Acknowledgements.

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#### Addendum.

In a paper received after this paper had been submitted for publication (R. G. S. MacGregor and G. L. Loh, "Comparison of Basal Physiological Values in Racial Groups. Part 2: Erythrocytes, Hemoglobin Content and Cell Count", *Journal of the Malaya Branch, British Medical Association*, Volume IV, 1941, page 385) the authors found a mean hemoglobin value of 16.2 grammes per 100 millilitres of blood for a group of 90 European men and 15.1 for 258 Asiatic men.

### PROBLEMS IN THE MEDICAL EXAMINATION OF RECRUITS.<sup>1</sup>

By A. B. ANDERSON,

Squadron Leader, Royal Australian Air Force,  
Perth.

WHEN the question of this paper was first mooted I was fearful that the subject matter might be of a distinctly uninteresting nature. Many medical men have been engaged part or whole time in recruiting medical duties, and the occupation is not generally regarded as being exciting or of engrossing interest. It was feared that unless care was taken to avoid it, the talk might crystallize into a mere recital of arbitrary standards and result only in acting as a mild soporific. However sympathetic one may feel towards the hard-worked medical man, it was not intended to contribute to his creature comfort by supplying a soothing accompaniment to slumber. I have therefore endeavoured to avoid concentrating on standards and to provide some information which, I hope, will help medical men to understand more fully the attributes which the prospective Air Force recruit is expected to possess. In view of the fact that the medical examination of ground staff applicants is similar to that of the Australian Imperial Force and that that subject is being dealt with by my learned colleagues, it has been decided to deal more particularly with the medical selection of air crew personnel. It has been my lot to be engaged in recruiting work for the Royal Australian Air Force since late October, 1939, subsequent to two months' life on an Air Force station and eleven months' pre-war service with the Citizen Air Force. This preliminary period is important, in that it presented an opportunity for me to come into close personal contact with flying personnel and to learn a smattering of flying "shop" and gain something of an insight into the flier's point of view and psychological attitude towards his job.

From whichever angle medical examination for recruiting purposes is viewed, one is forced to the opinion that it is a duty which must be regarded with the utmost seriousness, in that careless work is certain to result in considerable inconvenience and loss to the recruit, impairment of morale and efficiency of the force, and the loss of prestige by the medical section in the eyes of lay officers in the service. It is indeed considered that the benefit to the service of thorough initial examination is so great as to warrant the placing of sufficient time at the disposal of the examiner, to enable him to give careful thought to each individual case. The medical opinion finally expressed must be a purely disinterested one based on the medical facts; and indeed no other opinion is defensible in the

light of subsequent events. The examiner's personal feelings towards the applicant must be entirely disregarded and not permitted to cloud the issue. This does not mean that the applicant's "type" should not be considered. The matter will be further discussed among psychological considerations.

The following system has been adopted by the medical section of the Royal Australian Air Force recruiting centre in this State. After applicants for appointment as air crew personnel have been passed by the selection board (including an education officer), they present themselves to the medical section. The usual medical form is made out, with the applicant's name, age *et cetera*, and a specimen of urine is taken for examination for the presence of albumin and sugar. The applicant is meanwhile sent up to the consultant ophthalmologist for eye examination. On his return he is sent to an air crew medical examiner, who takes the history and writes the answers to the questions on page 1 of the form P/M8. If the applicant gives an affirmative answer to any of these questions, a careful history is taken and the details are written in the appropriate space. This may necessitate the obtaining of hospital or private practitioner's notes of an illness or operation and the deferring of a final decision until this information is to hand.

The recruit signs the form to the effect that the information written on page 1 is correct, and the medical officer proceeds with the examination. This can be subdivided into three sections: (i) general physical examination, (ii) special tests, (iii) assessment of neuro-psychological make-up.

#### General Examination.

Briefly, general examination includes an inspection of the recruit (fully stripped) in an orderly fashion from the head downwards, without attention to ears, nose or throat. An examination is made of the heart, lungs and abdomen, with particular attention to the tone of the abdominal musculature and the state of the inguinal rings and inguinal canals; full movements of all joints and the general routine examination as for ground staff are carried out. The effect of exercise (by skipping) on cardiac bruits or irregularity is noted, unless evidence of a frank organic lesion has been discovered. The arms and genital organs are closely inspected, and the state of the skin and any tendency to undue perspiration are observed.

#### Special Tests.

A number of special tests are then made. The recruit then partially dresses himself and is allowed to sit quietly at the examiner's table while the result of the physical examination is written up. The sitting pulse rate (taken over a period of fifteen seconds) is then recorded. He is told to stand up and the rate is again taken. Twenty steps are then taken on and off the chair and the pulse rate is noted. A final reading is taken at the expiration of one minute from the end of the exercise.

The applicant is allowed a few minutes' rest and then proceeds to perform the "fatigue test". This is carried out as follows. The applicant is instructed, after taking a preliminary deep inspiration and expiration, to inspire as deeply as possible; then, blowing through the glass mouthpiece, he is told to force the mercury in the U-tube up to the 40 millimetre mark and to hold it there as long as he possibly can and not to let go until he cannot last out a further second. At the height of inspiration the nose clip is adjusted and the pulse rate is subsequently recorded at intervals of five seconds until the candidate can no longer hold the mercury. The total time for which the mercury is held is then recorded.

#### Self-Balancing Test.

The candidate stands on one leg with the other thigh extended and the lower part of the leg flexed to a right angle. Having got his balance, he closes his eyes and stands as still as possible for a period of fifteen seconds. The performance is then repeated on the other leg. The knees are not allowed to touch and the foot on the ground must not be moved. The result is recorded.

<sup>1</sup> Read at a meeting of the Western Australian Branch of the British Medical Association on April 16, 1941.

### Tests for Tremors.

The recruit is told to stand with feet together, eyes gently closed and arms and hands outstretched, with fingers well separated. Tremors of fingers and eyelids are recorded.

At the conclusion of the examination the medical officer expresses his opinion on any variance from normality and states whether he considers the candidate fit in so far as his section of the examination is concerned.

### Ear, Nose and Throat Examination.

The candidate then goes to the ear, nose and throat examination room. A history of any ear, nose and throat trouble is first elicited. His hearing is tested and he is required to hear the whispered voice at twenty feet with each ear separately. His external auditory canals and tympanic membranes are examined. He is required to inflate his own Eustachian tubes by blowing with mouth closed and nose held, and the patency of his tubes is ascertained by observation of the movement of the *membrana tympani*. His hearing for sound at varying pitch is tested by means of three tuning forks, and a Rinne's test and a Weber's test are performed.

The efficiency of the nasal airways is tested and the nose is inspected for evidence of deflection of the septum, blockage of the airways by spurs or hypertrophied turbinates and any evidence of chronic inflammatory changes in the mucous membrane. Similarly the naso-pharynx, pharynx and buccal cavity are examined, and if any abnormality of voice is noted an inspection of the epiglottis and vocal cords is made.

The examining medical officer then expresses his opinion as to the fitness of the candidate in respect of the ear, nose and throat examination.

### The Final Assessment.

If any doubt arises during the course of the examination as to diagnosis or effect of any condition on function or prognosis, a consultant physician, surgeon or ear, nose and throat specialist's opinion may be obtained. The ophthalmological examination of air crew applicants is carried out by the consulting ophthalmologist; it consists of examination of visual acuity (uncorrected and corrected), tests of colour vision with classification as "N", "Def.", "Safe of def.", "Uns.", tests of ocular muscle balance, including tests for latent squint, powers of ocular convergence and accommodation. The fundus, retinae and media are examined, and the extent of visual fields is approximately measured.

Finally the candidate is seen by the president of the medical board, who, after study of the results of the examination, assesses him as to his fitness for flying as pilot, wireless telegraph operator, air gunner or observer, or for serving in any capacity as a member of an air crew.

A 35-millimetre X-ray photograph of the chest is taken in every case, as in army procedure.

Now that the routine of medical examination has been very sketchily disposed of, I propose to discuss some of the considerations which influence the president of the board in making his final assessment. This entails a knowledge of the stresses and strains to which members of air crews are exposed whilst in flight, of questions of air pressures and rapid changes in such pressures (affecting oxygen absorption), and of the possible effects of the intense cold experienced at high altitudes. Abnormalities discovered during the routine examination must be weighed in relation to these factors, and it will be clearly seen that matters which may be of minor import in the case of ground staff assume very different proportions when they occur in prospective members of air crews.

When it is considered that aviators may fly at heights of over seven miles, dive at 450 miles per hour and perform long and arduous night flights in bitter cold, it will be appreciated that no ordinary physical and mental stamina is called for. As altitude increases, the barometric pressure (therefore also the oxygen pressure) decreases, and consequently there is greater difficulty in absorbing sufficient oxygen through the lungs to supply needs. A decreasing oxygen supply may result in more rapid and deeper

breathing with "washing out" of carbon dioxide from the blood and eventual cessation of automatic breathing from reduction of the pH.

The maximum height at which the normal, unacclimatized, healthy subject can live without an oxygen supply apparatus is from 20,000 to 23,000 feet. For subjects with less efficient cardio-respiratory systems the height is lower, and the period of time for which unfavourable conditions with regard to oxygen pressure can be withstood is correspondingly less. The length of time for which a subject can withstand the low oxygen pressure at, for example, 15,000 feet, is diminished if that subject is not fit. Oxygen need increases with increase in metabolic rate, and metabolic rate increases when the subject is active. It also increases under the effects of emotional states, and the subject who is liable to increased cardiac and respiratory rates under the influence of excitement will therefore use up more oxygen. Tachycardia, tremors and increased respiratory rates are common under conditions of medical examinations, and are accompanied by increased hormone liberation and metabolic rate.

Cold similarly increases oxygen consumption by resulting in shivering. The effect of cold is apt to be more distressing to those subjects commonly seen in the examination room who present signs of unstable peripheral circulation. Such signs are cyanosis or pallor of the extremities (particularly seen in winter), and hot, clammy hands and feet in summer. A history of tendency to chilblains is of course of significance in this direction.

The tone of the peripheral blood vessels also appears to be of importance in the effect of high centrifugal forces on the body. The blackout (usually lasting a few seconds) which may occur in sudden changing of direction and speed (for example, in pulling steeply out of a dive) is thought to be due to the forcing of blood away from the head towards the abdomen and legs. For this reason also good tone in the abdominal musculature is important, as support is then given to abdominal organs and intraabdominal pressure is better maintained; this limits the blood capacity of the splanchnic vascular system. In power dives and manoeuvres in fighter type aircraft forces up to six times the force of gravity may be experienced.

Patency of the Eustachian tubes is of primary importance to flying personnel. Where the patency of one or both Eustachian tubes is not good, air may pass out from the middle ear sufficiently rapidly during relatively slow ascent to enable the air pressure on either side of the tympanic membranes to remain nearly equal with little or no discomfort. In descent, however, when the change of atmospheric pressure is much more rapid, alarming symptoms are likely to be experienced. There is first a sensation of fullness in the middle ear, followed by relative deafness, tinnitus and giddiness, and pain varying in intensity from a severe discomfort to agony. Rupture of the tympanic membrane can occur. It is therefore evident that conditions predisposing to Eustachian occlusion are to be considered carefully. Such conditions are chronic catarrhal states of the mucous membrane of the nose, naso-pharynx and pharynx, infected tonsils, defective nasal airways and the tendency to frequent recurring colds which do not clear up rapidly or are associated with deafness or tinnitus. Chronic or recurrent sinusitis is also of obvious importance.

It has been stated that decrease in the intermaxillary distance from loss of all molar teeth or from malocclusion of teeth produces in some subjects a Eustachian stenosis, which may result in the symptoms described above.

Vestibular instability with consequent tendency to vomiting can be a great handicap to the prospective pilot. Obviously, anything which interferes with a pilot's sense of his position with relation to the ground will be a danger to himself and his crew, and therefore a history of tendency to sea-sickness, air-sickness or giddiness on swings requires investigation. This may be examined by rotation of the subject in a chair, after which nystagmus, pronounced giddiness or vomiting may occur. A test flight in an aircraft is of help, although many pupils overcome through familiarity with flying conditions an initial tendency to air-sickness.



*The Psychological Factor.*

One of the most important factors—indeed, I feel I should be justified in naming it as the most important factor—in suitability for flying is the psychological make-up of the candidate. Flying under war conditions calls for cool judgement, courage and determination. It calls for a subjugation of the powerful instinct of self-preservation, in order that this instinct may not intrude upon the automatism required in efficient flying of an aircraft. The seasoned pilot flies his aircraft as the experienced driver drives his motor car. Many of his actions are of a semi-automatic nature; his higher centres decide on the matters of policy, and the actions necessary to carry out that policy are beautifully coordinated without any conscious focusing of the higher centres on them. The virtuoso playing the most difficult concerto is able to give his conscious attention entirely to the interpretation and phrasing of the music, because through practice and familiarity with the musical subject matter the physical movement by which he plays each note—that is, his purely mechanical technique—becomes automatic. Indeed, if his consciousness for some reason becomes focused on a feature of technique (as, for example, a passage which he has had some difficulty in mastering and of which he is not so confident) he is more likely to stumble at this particular passage.

So it is with flying. Any psychological factor which causes extraneous considerations to appear in consciousness and to focus attention on those actions which should be automatic, will interfere with a pilot's judgement.

It has been stated that up to 90% of failures in flying training are due to indirect lack of flying ability. This indirect lack of flying ability may be due to poor muscle-joint sense, poor ocular muscle balance or central appreciation of height and distance, poor reaction time, and lastly, but by far the most important, lack of the flying temperament. More specifically, this indicates an inability to prevent the instinct of self-preservation from interfering with judgement and coordinated action, or a sense of inferiority, which prevents the development of that confidence which is necessary to the successful pilot.

The quality of determination, if it is lacking, may be a contraindication to the acceptance of recruits for flying training. This applies equally to observers and to air gunners as it does to pilots. The fatigue test, though primarily designed as a test of cardio-respiratory efficiency, is a very useful test of both emotional stability and determination.

A high pulse rate during this test is frequently noted in recruits showing such signs as clammy skin, tremors, slightly raised body temperature and transient glycosuria. Some applicants will hang on until on account of cyanosis or an undue fall in pulse rate the examiner tells them to stop; others on the contrary will show little determination and give up at twenty or thirty seconds.

It is my experience that the exercise tolerance test is of even more value as an indication of emotional instability than as a test of cardio-vascular efficiency. In a young man a cardiac lesion of such severity as to lack the compensation necessary to give a normal result to the exercise tolerance test will seldom be inapparent on clinical examination. With the exclusion of those cases in which a poor result has been due to excessive adiposity, the large majority of cases in which there has been an undue increase in pulse rate after the exercise with slow fall to normal have been undoubtedly emotional.

It may be asked if the presence of signs of emotionalism are sufficient in themselves to warrant rejection for flying. My answer is that frankly I do not know. I do know, however, that they call for a close investigation into the personal and family history of the recruit and that they call for due consideration when other factors are also present, and may tip the scales against him. I do know that they call for the spending of adequate time on their elucidation and investigation and that they should be recorded in detail. I know also that much valuable instructing time may be spent, equipment may be damaged and lives may be lost through inattention to just such details; yet the correlation between these findings

at recruiting centres and the subsequent performance of flying trainees is by no means certain.

We are hoping by collaboration with our colleagues at flying training schools to be enabled to ascertain the reasons for failures to learn to fly and by close study of the reports of initial examinations to learn more with regard to the significance of our findings in the light of instructors' experiences with recruits.

With regard to the significance of psychological features, much depends on the judgement of the examiner; and sound judgement comes only as a result of experience logically applied. The experience of others is not of so great a value as is the case in regard to physical defects, as each individual presents an entirely new set of features, which must be carefully pieced together to show the composite picture of that person's temperamental make-up.

*Conclusions.*

Much more could be said on this aspect of the examination, but time does not permit. However, if an applicant is rejected for reasons of temperament, let it be understood that this has not been done without very careful consideration, probably after the candidate has been given the opportunity of repeated examinations and enabled to become accustomed to the atmosphere of the examination room.

The standards laid down for air crew personnel are severe; but they are the results of the vast experience of the Royal Air Force, and the maintenance of this high standard of physical, psychological and intellectual fitness for their job is in no small measure responsible for those records of courage and endurance which have made us proud of our race and of our flying men.

*THE MEDICAL EXAMINATION OF ARMY RECRUITS.<sup>1</sup>*

By G. R. TROUP,

Major, Australian Army Medical Corps.

ARMY medical examinations include those for the Australian Imperial Force, home service units, such as the garrison battalions and others, Militia units and the Australian Army Nursing Service. The medical examination is essentially the same for all these services and, with the exception of the Militia, includes a routine micro-radiographic examination of the chest. These X-ray films are reviewed by a radiologist and in doubtful cases a reexamination is made on a large film. If the result is still in doubt the film and the recruit are reviewed by a board before acceptance.

As a result of the examination recruits are classified "Class I", "Class II A", "Class II B" and "Unfit". Disabilities capable of correction allow a sub-classification of "Temporarily Unfit" for the particular class into which the recruit falls.

To give you some idea of what happens in the examination of a large number of potential recruits, the details of the result of a recent examination for the Militia of age groups up to thirty-three years may be quoted (Table I):

TABLE I.  
*Results of Medical Examination of 4,575 Militia Recruits.*

Classification.	Number.	Percentage of Total.
Fit, Class I .. .. .	3,149	77
Fit, Class II A .. .. .	354	
	3,503	
Fit, Class II B (not attested) .. .. .	145	23
Temporarily unfit .. .. .	363	
Unfit .. .. .	564	
	1,072	

Of the 3,503 "Fit Class I and II A", 511, or 11% of the total examined, were "man-powered", and the Army finally got 2,992, or 65.4%, for recruits.

<sup>1</sup> Read at a meeting of the Western Australian Branch of the British Medical Association on April 16, 1941.

The standard of acceptance in the different services varies. It is highest in the Australian Imperial Force, where Class I personnel only is accepted, except in very special circumstances. Furthermore, in the Australian Imperial Force examination, eyes, upper respiratory tract, ears and mouth are reviewed by specialists in each branch, and the final medical examination is carried out whenever possible by a board of specialists consisting of physicians, surgeons and orthopaedists. In spite of these precautions, numbers of Australian Imperial Force personnel have had to be "boarded out" of the Army, some after they have been in camp for varying times, others after they have gone overseas.

The disabilities for which men are "boarded out" of the Australian Imperial Force in this command are periodically reviewed, and I should like to bring to your notice a few of the commoner medical disabilities which are the stumbling blocks.

The following is the result of reviews carried out during the last twelve months by some 291 Australian Imperial Force medical boards:

TABLE II.

Disability for which Recruit was "Boarded Out".	Percentage of Total.
Mental and nervous disorders (including epilepsy) ..	26.7
Digestive disorders (including peptic ulcer) ..	12.8
Defects of lower extremity ..	18.4
Defects of upper extremity ..	1.8
Pulmonary tuberculosis ..	8.5
Pulmonary diseases other than tuberculosis (including asthma) ..	5.5
Other conditions (skin lesions, hypertension, cardiovascular disorders, fibrositis, hernia, defective vision, chronic colitis, renal calculus, over age <i>et cetera</i> ) ..	26.3

At the risk of boring you with a few more figures, I should like to give you the details of the last 39 invalids disembarked in this command from overseas (Table III). Most of the 39 disembarked, with the exception of some of the battle casualties, will have to be "boarded out" of the Army.

TABLE III.

Disability.	Number of Subjects.
Mental and nervous disorders ..	12
Digestive disorders ..	2
Pulmonary diseases—	
Asthma ..	6
Other ..	1
Wounds and fractures ..	6
Impaired constitution ..	3
Others (arthritis, hernia, Hodgkin's disease, dermatitis, hematuria, chronic otitis media, myocardial insufficiency) ..	9
Total ..	39

From the foregoing it can be seen that between 30% and 40% of recruits "boarded out" of the Australian Imperial Force are so "boarded" for either mental and nervous disorders or digestive disorders. For the detection of these conditions the examining medical officer is almost entirely dependent on the medical history. False and misleading information in regard to the above conditions is common, and to diminish this tendency large notices have been placed in the examination halls warning recruits of the penalties involved. Recently an actual prosecution took place in one glaring example of misrepresentation and a fine resulted. Irksome as it may be, the taking of the medical history by the examining medical officer himself will tend to obtain more reliable information, and for Australian Imperial Force examinations this procedure will in the future be necessary.

Even with these precautions psychopaths and psychoneurotics will slip through. It is hard to believe that such a man can be in camp undergoing training for

weeks without its becoming obvious to intelligent non-commissioned officers and platoon officers that all is not well. The unit should accept some blame for the retention of such a man up to the time of embarkation.

Digestive disorders will always be a problem. If every man who confesses to a few days' mild dyspepsia is rejected, many excellent men will be refused, and if they are not, some who are actually suffering from peptic ulcer will be accepted. It would appear that the knotty problem must be left to the discretion and astuteness of the individual medical officer.

The subjects of pulmonary tuberculosis appearing in the reviews were practically all found by the routine micro-radiographic examination. As this is not made until after the recruit has been attested in Australian Imperial Force personnel, board papers have to be prepared to enable him to be discharged. Under examination conditions it is difficult if not impossible to detect these patients clinically.

The non-tuberculous pulmonary patients "boarded out" were mainly asthmatics. Here again the correct history is of paramount importance, and in practically all cases it was found that a misleading history had been given. Chronic bronchitis may be recognized after an acute or subacute attack; but at other times, in the absence of any history, it is extremely difficult, if not impossible, to recognize it in young men. In this type of case and in asthmatics the X-ray examination of the chest is not of much help.

Cardio-vascular disease as a ground for "boarding out" is refreshingly small. It appears that the examining medical officer is taking full notice of the significance of the presystolic and diastolic murmur, the enlarged heart and the raised diastolic blood pressure.

The high upper age limit of forty years for the Australian Imperial Force brings its own difficulties and problems. Those approaching the forty mark who have led an inactive sedentary life are likely candidates for future medical boards when called upon to stand up to the stress and strain of active service. Misrepresentation of age at this upper limit is often hard to detect. It is usually easy to separate the twenty-eights from the thirty-eights, but much more difficult to distinguish the thirty-eights from the forty-fours. When there is reasonable doubt of the age, verification should be demanded before the recruit is accepted.

Finally, criticism of recruit examination results must always be tempered by the fact that these men are going to environments and conditions very different from those to which they have been used, and that potential disabilities undiscoverable by ordinary methods of investigation, clinical or otherwise, may be thereby brought to light.

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#### PROBLEMS OF AN ARMY MEDICAL EXAMINER.

By R. J. D. TURNBULL, M.B., B.S. (Melbourne),  
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Officer, 12/50th Battalion.

THE ever-growing number of men who are being called up for military service at home and abroad means an increasing amount of work for an increasing number of medical men, as the stage has now been reached when the burden of examining large numbers of men can no longer be carried out by officers on the active list, but must be done by the profession as a whole. During the second call-up of universal service trainees I had to examine 1,300 men, whilst in this last call-up there were nine examiners for 1,800 men.

When first commencing to examine recruits at the beginning of the war, I found it extremely difficult to adjust my mind to the military opinion that a man

"Class I" in life assurance examinations may be only "Class II" or even unfit for military purposes. After eighteen months, and having examined over 4,000 recruits, I find that I still have to seek advice from my Deputy Director of Medical Services on many points. As so many medical men will now be called upon to examine recruits, I felt that the solution of some of our problems may help others. I have been inspired by that excellent paper in THE MEDICAL JOURNAL OF AUSTRALIA by those members of the medical staff of the hospital ship *Manunda*, whose findings must have been of great help to all members of the Australian Imperial Force boards. To be an examiner of recruits requires long experience of such work, for, although a pamphlet is issued with instructions for such medical examinations, numerous questions are untouched. There can be no doubt that to obtain uniformity and perfection it would be necessary to have full-time medical officers for the work; otherwise unfit men will be accepted, and in some cases men with only trifling defects may be rejected by an over-conscientious medical officer. The Royal Australian Air Force system of having permanent medical officers is an excellent one and must save the cost of having many men accepted and later rejected. Not only does this type of work require experience, but I would go further and state that no officer is competent to examine recruits without first having served for some period in military camps as a regimental medical officer, in order to note personally which minor disabilities are apt to make men unfit. Furthermore, being a member of an Australian Imperial Force board does not qualify one as an examiner of universal service trainees. In the former case the men answer in the negative all the questions on their "AAF.DI.", whereas in the latter case a large number are trying to evade service by answering in the affirmative as often as they can.

It has now been ordered that the "AAF.DI.", which is the medical questionnaire, must be filled in by the medical officer. In the opinion of those with practical experience of examination, this appears to be quite an unnecessary waste of the time of the medical officer. So long as the recruit is asked to read his paper carefully before entering the room and is also warned that false answers render him liable to prosecution (this is best done by a large notice at the entrance of the examination room), then there is no reason why an experienced clerk should not ask the questions and fill in the papers prior to the examination. The time to fill in a paper takes almost as long as the actual examination; hence the medical officer's time could be almost halved. The medical officer can ask for further details if he finds a question answered in the affirmative. If a recruit desires to shield some illness he will answer in the negative whether a clerk or a medical man is asking the question. Often men on being "boarded" for unfitness state that they answered "no" to a question because they did not hear or understand it. This excuse is still accepted by such boards, although it may be known that the men are asked to read their papers, and further, that they should not answer if they do not understand the question. More important than the asking of the questions is that all measurements, weights and vision tests should be made by the medical officer himself in every case to ensure accuracy. Also it appears to be difficult to impress on medical officers—even on Australian Imperial Force boards—the necessity not only of recording all scars and deformities, but also of recording their exact position.

I do not believe that many men have the opportunity or the ability to memorize a vision card and thus "bluff" the medical officer that they have normal vision. Nevertheless it is wiser to make recruits read lines backwards and to change the card frequently.

One man, passed by me with normal vision, was some months later "boarded" out of the Australian Imperial Force with visual acuity of only 6/60 in the left eye. He said that he had memorized the card whilst standing at the door awaiting his turn.

This may be true; on the other hand, he may have been tired of the army and have just refused to read the test

types below 6/60—a much easier feat than memorizing a vision card!

In dealing with universal service trainees the suspicion of malingering must always be present if a recruit says that he cannot read a line when there is no obvious cause, such as an injury or strabismus. According to the instructions, a man may be classed as "II A" or "II B" if he has visual acuity of 6/12 with one eye with glasses; such a man need not be rejected even if he has no vision at all in one eye without glasses. If a man is illiterate, it is the practice to accept him if he can see small objects at a distance of twenty feet.

In regard to the subdivision of Class II into "A" or "B", in most examinations the recruit must be relegated to Class II B, as the examiner very rarely knows what specified duties are available for the recruit. To accept a man for Class II A or II B, the disabilities must be both non-constitutional and non-progressive; but no matter what the disability, I am afraid that it will always be a cause for later pension claims. Whilst I am on the subject of Class II men, it must be apparent to regimental medical officers that a great many positions in a unit, especially in unit and company orderly rooms and in kitchens, are filled by Class I men. No Class I man should be allowed to have these appointments. Pioneer sections should be wholly made up of Class II men; there are many physically able men, rejected from Class I for poor vision, who could perform this work.

In cases of hernia it is necessary to examine the recruit fully and then to mark him as temporarily unfit, as many men will later undergo the operation to make themselves fit. Many universal service trainees present themselves with bubonocoeles, and as they are not even aware of their condition I have been in the practice of accepting them as Class I. This appears reasonable as long as the disability is noted under the heading of slight defects.

Foot disabilities constitute a most difficult problem for examiners. So many men with minor foot disabilities have been passed by boards and later discharged after a few months in camp that on first thought it would appear safer to reject all men with any foot complaint, such as corns, bunions, overlapping toes and flat feet. But there can now be no doubt that the greater percentage of men so discharged were men who wished to be discharged and in their desire to escape have grossly exaggerated their minor disabilities. My colleagues and I have received many official complaints for accepting such men, and having become stricter with regard to feet, I am sure that we have rejected many an enthusiastic man without giving him a trial. If a man with a minor foot disability is keen enough to enlist, he should at least be given a chance to prove himself. Many a man with a gross flat foot can march thirty miles a day if the will is there. Many of these men can easily be cured if a trained chiropodist is attached to all recruit receiving depots. It was amazing to note the amount of foot trouble in our militia battalion at the beginning of a three months' camp and the cures effected by the attachment of a trained chiropodist to the battalion. An overlapping toe apparently automatically causes a recruit to be rejected; but this should not be so if there are no corns on the offending toe—such men should be accepted. In fact, I am of the opinion that we should accept all men of a good type with minor foot disabilities, even though some may later be discharged.

Varicose veins are a cause of more rejections than any other single disability or disease, yet they are hardly mentioned in the instructions beyond the statement that they are to be looked for. As a rule slight varicose veins below the knee are not a cause for rejection, whilst men with gross varicose veins below the knee are suitable for Class II. Any veins affected above the knee will make the recruit temporarily unfit. As the saphenous vein is often not visible, but only palpable, the examiner should always run his hand along the course of the vein, and if it is palpable the recruit is temporarily unfit.

The question of accepting men with goitre was until recently another problem, when it was directed that no



man with a goitre, simple or toxic, or who had had such a goitre surgically treated, could be accepted for active service. Goitre is endemic in parts of the State, and we can find no reason why these men should be rejected for a non-toxic goitre if they are under the age of thirty years. At least there would appear to be a definite place for these men in the universal service trainees scheme, even if not in the Australian Imperial Force. Exophthalmos in the absence of an obviously enlarged gland is sufficient ground for rejection.

The most controversial cause of rejection is elevated blood pressure. The generous limits are a systolic pressure of 160 millimetres of mercury and a diastolic pressure of 100 millimetres of mercury, to be taken only in men over the age of thirty years. If these limits are exceeded the recruit has to lie down for half an hour before his pressure is retaken. A recent circular states that men should be rested in comfort in a warm room to minimize any rise in blood pressure; but I regret that these requirements are more easily stated than acquired. Even the area office has not these idealistic surroundings, let alone the draughty cold halls in which most examinations for the universal service trainees have to be made. If high blood pressure is to be a cause of rejection, why should the nervous element be so carefully eliminated? If nervousness before a medical board causes a rise in blood pressure, then surely to face an enemy firing line would do the same. Many a man otherwise physically fit would have to be rejected if the maximum ranges were strictly adhered to. Arteriosclerosis and albuminuria are far more important guides for rejection than a high systolic blood pressure. Many men rejected return in one or two weeks' time for a further examination after having treatment (probably with phenobarbitone and bromides) and, their blood pressure now being normal, they are accepted. As they cannot possibly be "cured", is it right to accept these men?

Examination of the urine constitutes another difficult problem. Glycosuria apparently occurs more often than albuminuria. In the recent call-up of men aged between twenty-five and thirty-four years, among 1,800 men there were less than 1.5% with sugar and less than 1% with albumin in their urine. Glycosuria *per se* should never be a cause of rejection so long as it is recorded. Further tests are often impossible, as either the recruit has to return home that day or the examiners have passed on to another town. I feel that the recruit with no familial history of diabetes and a normal blood pressure should be accepted if there is no opportunity for a further test. Very few of these men can afford the time or money for a blood sugar estimation; many regard time off for an examination as an opportunity to have several drinks, which may account for a mild glycosuria. At first we were using Benedict's solution for these tests, but the number of positive results made us quickly change to Fehling's solution.

As with glycosuria, so with albuminuria—it is difficult to reject a recruit because of it when the blood pressure is normal and there is no history of scarlet fever. These men should be accepted if there is only a trace of albumin in the urine.

No minimum weight standards are laid down in the book of instructions, but the standard should be taken as 112 pounds for Class I. In Class II no minimum weight has ever been laid down.

As I have pointed out before, the difference between examining recruits for the Australian Imperial Force and universal service is that the former are eager to enlist and some of the latter are anxious to evade their duties. If the examiner is at all suspicious—and I always am if the recruit answers "yes" to more than two questions—then he should pass him as "Fit, Class I", but add a note as to his reason for so doing, to guide the regimental medical officer at the camp, who may otherwise promptly discharge the recruit. If the examiner accepts the varied excuses, he will find that all the men have serious disabilities. Many universal service trainees feel it incumbent on them to try to evade duty; but when their "bluff" is

called they accept the inevitable and make excellent soldiers. Others try to carry on their "bluff" in camp, and may be discharged by an over-sympathetic regimental medical officer. As a regimental medical officer I have found that these universal trainees soon settle down and rarely attend on sick parades. I have nothing but the warmest admiration for these men in regard to their medical behaviour.

Medical certificates are another source of annoyance to the examiner. The majority are worthless, as so often medical men with very little knowledge of military requirements and a desire to assist their own patients cheerfully state that a recruit is not fit for military service. A certificate should state only facts and not opinions. Then there are the medical certificates on which it is stated that the patients are not fit to receive "T.A.B." or anti-tetanus inoculations. I trust that they are sincere. Certificates given to men rejected for the Australian Imperial Force should be classified as to whether the men are totally unfit or whether they are fit to carry out other duties; many men appear at Australian Imperial Force boards only to obtain certificates showing that they have been rejected. On asking if they are suffering from any disability they always answer: "Yes." I had much pleasure in passing one such man, who stated that he could not bend his back.

I feel that we are losing a great opportunity to improve the health of the community and at the same time increase the number of Class I men. With the ever-increasing demand for reinforcements we should do all we can to improve our standard of health. Unfortunately I am unable to go into details regarding those rejected; but at a conservative estimate, of those who fail to attain Class I, almost 50% have only minor disabilities, most of which can be easily cured. Full dentures at a cost of two or three pounds are given to members of the Australian Imperial Force, whereas a few shillings cannot be spared to make men with varicose veins fit for Class I—and there are hundreds of men rejected for this reason. Even if they are not acceptable for the Australian Imperial Force, they could be treated and made fit for home defence. The treatment of minor foot disabilities and varicose veins could easily be carried out at camp dressing stations. Many men are rejected for hernia; if they are willing to serve their country it should not be too much for the Government to treat them surgically.

I do not think that the medical standard for the Australian Imperial Force is too high; but the present system of "boarding" men of the militia forces appears to be stringent. After all, the militia are only mobilised for home defence, and if such a procedure is necessitated by an emergency we would need every man possible, whether he belonged to Class I or Class II. Many a man unfit for the Australian Imperial Force should be fit for home defence; but the present method of "boarding" the militia recruits on active service standards has resulted in a great crop of Class II men. If there are no posts for this class, they are promptly discharged and hence wasted. As one commanding officer recently stated, his unit would soon consist only of Class II men entirely surrounded by medical officers.

A general revision of the present system of examinations is urgently indicated. This could best be done by a conference of area medical officers and senior examining officers to discuss matters which, judged according to their practical experience, require alteration.

#### Addendum.

Having just completed as a member of two medical boards an examination of a further thousand militia men—members of two units, an infantry battalion and a light horse regiment—I am adding statistics regarding these men (Table I). Only 75% were found to be Class I, although they had all been examined previously. Of the 230 men found to be temporarily unfit or suitable only for Class II, over 120 had disabilities in the lower extremities; of these, one-third were varicose veins. Over half of these recruits with lower extremity disabilities

TABLE I.  
Statistics Regarding Number of Men Rejected as Unfit and Number of Men Temporarily Unfit or Fit for Class II in 1,000 Examined.

Disease or Disability.	Unfit.	Temporarily Unfit and Class II.
Disabilities of the lower extremities:		
Varicose veins .. .. .	1	44
Corns—painful .. .. .	—	13
Hammer toes with corns .. .. .	3	11
Hallux valgus .. .. .	2	4
Pes carus .. .. .	—	4
Flat feet .. .. .	2	12
Other causes .. .. .	—	20
Vision .. .. .	5	11
High blood pressure .. .. .	3	1
Goitre .. .. .	15	1
Rheumatic fever .. .. .	5	2
Neurasthenia .. .. .	—	2
Obesity .. .. .	—	1
Hernia .. .. .	—	19
Varicocele .. .. .	—	1
Ear, nose and throat:		
Otitis media .. .. .	1	3
Other lesions .. .. .	—	3
Possible pulmonary tuberculosis .. .. .	2	8
Fractured skull sequelae .. .. .	1	—
Malaria .. .. .	1	—
Gastro-intestinal disorder .. .. .	1	3
Asthma .. .. .	5	—
Poor physique .. .. .	2	11
Fistula in ano .. .. .	—	1
Hæmorrhoids .. .. .	—	1
Total .. .. .	56	177

could, at very little cost, be made fit for Class I. Many of these men have been in camp for two months and have not been affected by their disabilities.

## Reviews.

### THE MIND.

In the preface to "The Human Mind"<sup>1</sup> Dr. Murdo Mackenzie states: "The notion of man's mind as a discrete organ with a specific function, working in rhythm in space and time and driven by strictly mental forces is, I think, new, and elaborated for the first time in this book." The two morbid mental reactions which receive special notice are depression, the persisting sense of personal inadequacy, and anxiety with its over-activity and under-efficiency. The author suggests that the mind of the depressive works in terms of deliberation, "a persisting effort to damp down the intensity of the actual moment at any cost", and simplification, a "process of contracting the facts into a unifying principle". Anxiety, according to Dr. Mackenzie, is associated with a sense of incompetence, to be distinguished from the inadequacy of depression.

This little work is a strange compound of the speculative and the trite. From somewhat involved discussions on the displacement of mental forces in time and space, immediacy, superadequacy and other concepts, some novel, most now commonplace but presented under a new terminology, one is relieved to come across the simple observation that the organ of the mind responds to overwork by fatigue and to internal dysfunction by reduced efficiency.

The sound advice in which this book certainly abounds is not restricted to the treatment of morbid states of mind. Where two or three are dining together "it saves discomfort", says Dr. Mackenzie, "to let the actual-minded ('realists') take charge of the tipping", for "they are up and at the recipient before he can begin, should he show any indications of dissatisfaction". "A trained professional waiter", we are told, "spots quickly whether his client is one who enjoys a row or not, and, in the former case, bows him out with great decorum on just under a reasonable tip".

In a final chapter the author applies his principles to current social and political problems, and discusses the simplified immediacy of Berlin and the amplified deliberation of Moscow. Undoubtedly Dr. Mackenzie has succeeded in

<sup>1</sup> "The Human Mind: The Organ of Thought in Function and Dysfunction", by M. Mackenzie, M.D., M.R.C.P.; 1941. London: J. and A. Churchill Limited. Crown 8vo, pp. 222. Price: 7s. 6d. net.

formulating some principles which he finds of sound therapeutic value. It is possible that the more intellectual of his patients may grasp what he is driving at, but more likely that the man with a method exercises prestige suggestion. While sedatives have their place in Dr. Mackenzie's therapeutic armamentarium, it would appear that he can dispense with shock therapy: his depressives are never melancholics. The author has made a bold attempt at the construction of laws and principles in mental functioning, the validity of which will have to stand the test of others' experience.

Dr. Mackenzie has spared his readers all consideration of previous work which has been done along similar lines. Perhaps after all he is entitled to the claims he makes in the preface.

### ACTINOTHERAPY AND DIATHERMY.

The second edition of E. B. Clayton's "Actinotherapy and Diathermy"<sup>1</sup> is, like the first (published in 1939), written primarily for students wishing to pass the second part of the electrotherapy examination of the Chartered Society of Massage and Medical Gymnastics.

The author has improved the work by rewriting the chapter on short-wave diathermy, which deals with both the condenser field and inductance type of machine. In this chapter there is a mention of artificial fever, but there is no reference to the use of the fever cabinet. We think that this subject might have been considered fully or else omitted.

The physics of heat, light and electricity are adequately dealt with, and the various types of machines rather fully described; the various techniques for the application of the desired treatment are clearly and concisely given, and the bodily ills that may be benefited are considered.

The physiological effects also of heat, light and the various diathermy currents are well described. The section on long-wave diathermy seems to take up too much space when we consider the relative importance now of long-wave and short-wave currents.

Diagrams are liberally used to help in description, and are clear, simple and instructive; the same may be said of the style. The book is well printed and is furnished with a reasonably full index.

### PRACTICAL PHARMACOLOGY.

PHARMACOLOGY is a subject which does not lend itself readily to treatment in such an interesting form that one is led to browse along through chapter after chapter simply because it is good reading. Professor Clark's "Applied Pharmacology" is, however, such a book. The seventh edition of this well-known work has appeared under wartime conditions.<sup>2</sup> Professor Clark consequently feels that the preparation of this edition has had to be more hurried than he wished, but the reader will find little cause for complaint on this account. The revision has been quite comprehensive. New chapters have been added on the sulphonamide drugs and on the pharmacology of the hemopoietic system. A novel chapter is concerned with the general principles governing the concentration of drugs in the blood under varying conditions of administration. Such knowledge is naturally essential for the rational use of drugs, yet it is a side of pharmacology which has been neglected. As a result drugs are prescribed to be taken at intervals which are determined largely by habit, and with the vaguest notions regarding the mass action of the active agent in the patient's body. Reliable data on this subject are still limited, but Professor Clark has given an interesting survey of the more important findings. In spite of the additions and revisions, the size of the book has not been increased. The author's plan of giving a brief account of the normal and pathological features of a physiological system followed by a discussion of the action of pharmacological agents on that system in health and disease is carried out with great skill. Conciseness is balanced against a comprehensive presentation of facts of importance. Every student of pharmacology and of therapeutics should possess this book, and the medical practitioner will find its pages interesting and refreshing.

<sup>1</sup> "Actinotherapy and Diathermy for the Student", by E. B. Clayton, M.B., Ch.B.; Second Edition; 1940. London: Baillière, Tindall and Cox. Demy 8vo, pp. 204, with illustrations. Price: 8s. 6d. net.

<sup>2</sup> "Applied Pharmacology", by A. J. Clark, M.C., M.D., F.R.C.P., F.R.S.; Seventh Edition; 1940. London: J. and A. Churchill Limited. Demy 8vo, pp. 682, with 92 illustrations. Price: 21s. net.

# The Medical Journal of Australia

SATURDAY, AUGUST 2, 1941.

All articles submitted for publication in this journal should be typed with double or treble spacing. Carbon copies should not be sent. Authors are requested to avoid the use of abbreviations and not to underline either words or phrases.

References to articles and books should be carefully checked. In a reference the following information should be given without abbreviation: Initials of author, surname of author, full title of article, name of journal, volume, full date (month, day and year), number of the first page of the article. If a reference is made to an abstract of a paper, the name of the original journal, together with that of the journal in which the abstract has appeared, should be given with full date in each instance.

Authors who are not accustomed to preparing drawings or photographic prints for reproduction are invited to seek the advice of the Editor.

## THE AUSTRALIAN BROADCASTING COMMISSION AT THE CROSS ROADS.

THE appointment of a select committee of the Federal Parliament to take evidence and to submit a report on the subject of broadcasting is an event of considerable importance to every intelligent member of the community. This is not merely a question of interest in the programmes transmitted over the air—whether particular tastes are satisfied or whether the dial of the radio must for ever be kept turning in search of something that will give pleasure. What does give concern is that the national broadcasting organization shall be allowed to fulfil its destiny and to give to the people of Australia the service that it is its function to give. According to the provisions of the *Australian Broadcasting Commission Act 1932*, the Commission is required to provide and to broadcast from the national stations adequate and comprehensive programmes and to take in the interests of the community all such measures as in the opinion of the Commission are conducive to the full development of suitable broadcasting programmes. In the exercise of its powers and functions the Commission is authorized to publish such papers, magazines, periodicals, books and other literary matter as it thinks fit. The Commission may, if it thinks fit, broadcast "a programme supplied by any organization, firm or person engaged in artistic, literary, musical or theatrical production or in educational pursuits". This statement of the powers and functions of the Australian Broadcasting Commission is somewhat vague; but we may sum up the functions of such a broadcasting body in three words: information, education and entertainment. The radio has become such an intimate part of community life that few people stop to consider its why and wherefor. With the aeroplane, the radio has contrived to contract the world into a smaller sphere. The people of one nation live almost in the pockets of another; they are certainly within earshot. The Prime Minister of Great Britain talking at a meeting in London might just as well be in our own homes; in

fact, if the transmission is direct, we hear him in Australia before he is heard by those sitting at the far end of the hall in which he is speaking. The President of the United States of America in his "fireside chat" is to all intents and purposes sitting by our own hearths. If we had never thought of the radio as a source of news before the war, we have in the last two years learned to take radio information for granted. Of course the information that is broadcast covers many spheres of activity and interest, and everyone, from the farmer to the sportsman, the dealer on the stock exchange to the schoolboy, is catered for in the carefully selected informative sessions of today. To a certain extent education and entertainment "on the air" are distinct entities; but when the former is achieved in the garb of the latter, a high grade of art is attained. The cultural side of Australian life owes a great deal to broadcasting, and what has been accomplished redounds to the credit of all the broadcasting systems. One thing is certain—and this is as true of broadcasting programmes as it is of articles published in medical journals—it is impossible to please everybody and foolish to try. On the cultural side a great deal has been gained. For example, the musical appreciation of the people has been raised—many who a few years ago knew little or nothing of the work of the great composers have learned to appreciate and love them. That entertainment can be deliberately combined with education is apparent to anyone who listens to Mr. Lindley Evans's "Adventures in Music" or to Professor Bernard Heinze's method of explaining a symphony to school children. But the combinations need seldom be deliberate. This is of importance to all intelligent persons who wish to instil into the minds of those around them the knowledge that intellectual pleasures are more abiding and therefore worthier of cultivation than those of other types. An appreciation of music, drama and the other arts is essential to the full development of the Australian people, and the broadcasting systems of the Commonwealth are educating them often without their knowing it. Another way in which broadcasting bodies have been leading the people to better and fuller knowledge—in other words, educating them—is in the transmission of talks on health, its promotion and what it means. This is the reason for the present discussion.

A little over a year ago attention was drawn in these pages to the establishment by the New South Wales Branch of the British Medical Association of a Department of Medical Sociology and Research. The object of this department was to render "a public service by collecting and compiling records of medical and sociological importance based on accurate information for dissemination among the public by every available channel, such as the public Press, public addresses and broadcasting". As readers of this journal are probably well aware, more than forty talks have been given over the national network of the Australian Broadcasting Commission since the New South Wales Branch department was established. The "B.M.A. Spokesman" has become a popular feature with the listening public—so much so that a "fan mail" is received with unfailing regularity by him; and it should be known that a reply is sent to every letter, many important questions are answered, and we can have no doubt that the cause of preventive medicine and an appreciation of its value have been promoted. Extensive



references to these talks have been published in *The A.B.C. Weekly*, the journal of the Australian Broadcasting Commission, and some of the talks have been published in full as a separate volume, the first edition of which has been sold to the last copy. The New South Wales Branch is naturally very gratified at the success that has attended its efforts and has determined to be among those who will avail themselves of the invitation of the Select Committee of the Federal Parliament to submit views or suggestions on the conduct of broadcasting in Australia. The Council has approached the Federal Council of the British Medical Association in Australia, and the President of that council, Sir Henry Newland, acting in accordance with the plenary powers enjoyed by him in the intervals between meetings, has authorized a statement drawn up by the New South Wales Branch Council to be sent to the Parliamentary Select Committee on behalf of the Federal Council. In this statement the New South Wales Branch Council insists that education of the lay public in basic principles of health and medicine is indispensable to the community's progress towards higher standards of personal health and public hygiene. It enlarges on this theme and ranks education in the basic principles of scientific medicine as equal in importance for national health and fitness as a knowledge of music and the other arts is for Australian cultural development. He would be foolish who would deny that national health and fitness on the one hand and complete cultural development on the other are complementary. The Council also lays stress on the need for adequate time for a broadcast on health, and makes a telling observation that as the prestige of science rises it becomes increasingly easier to influence the public by pseudoscientific references to glandular extracts, vitamins, vaccines and other applications of medical research. The education of the public in health matters therefore becomes all the more urgent. The Council rightly insists that the broadcasts of the "B.M.A. Spokesman" shall be circulated as widely as possible; for this reason it is strongly opposed to the suggested abandonment of *The A.B.C. Weekly*—the journal "is indispensable to the full functioning of the national broadcasting service".

In supporting the views set out in the statement of the New South Wales Branch, we first of all pay a tribute to the efforts of the Australian Broadcasting Commission in a cultural direction, bidding it not to be weary in well-doing, but to give the people gradually a stronger and fuller diet as their powers of digestion increase. Secondly, we urge the Commission to continue unabated its exploitation of what we described last year as its "magnificent opportunity of serving the public in the matter of health". Most questions can be boiled down to motives. The motives of the Australian Broadcasting Commission in its cultural and health ventures have been the highest; it is to be hoped that the select committee will inquire into the motives of any who may try to draw the Commission aside from its high purpose. Not one of the Commission's activities that have been under discussion should be discontinued. If *The A.B.C. Weekly* cannot be made to pay (we fail to see why it cannot), then the Commission should be allowed to regard it, in addition to the other purposes for which it is used, as a means to a cultural and health-promoting end—and this is worth the expenditure of quite a large amount of money.

#### A WARNING TO USERS OF DIATHERMY APPARATUS.

SOME years ago there occurred a fatality with a diathermy machine when a medical practitioner undergoing treatment was electrocuted. We have heard that a somewhat similar fatality has recently taken place and understand (see letter on page 129) that this second accident has been the result of the way in which the machine is wired and of the proximity of a metallic screening apparatus recently installed. The type of machine is an old one and it is so wired that disaster may overtake a patient who is being treated if he comes into contact with a metallic body, such as a screening apparatus that is earthed. All users of diathermy machines, particularly if they are not of modern design, are urged to obtain without delay the expert advice of an electrical engineer to ensure the safety of their patients and themselves.

#### Current Comment.

##### LEUCÆMOID REACTIONS.

It has been said that Nature abhors a vacuum; it is also true that she abhors clear-cut distinctions and rigid classifications. This is particularly well seen in the study of diseases of the blood. The picture of acute leucæmia, that baffling and unconquered disease, seems definite enough; yet it has been known for years that blood pictures simulating leucæmia occur in rare non-leucæmic conditions, and leucæmia may yet be regarded as a symptom complex with a variety of causes. Since the introduction of chemotherapeutic agents of the sulphanilamide group, leucæmoid reactions have become sufficiently common to arouse general interest. J. M. Hill and C. N. Duncan present a thoughtful discussion of these reactions.<sup>1</sup> They observe that normally the leucocyte release mechanism seems to depend on the fact that active motility is found only in the relatively mature cells. In order to enter the blood stream from their extravascular point of origin, it is believed that leucocytes pass through the endothelium of the marrow capillaries and sinuses by amoeboid movement. What, then, is the mechanism by which immature, less motile cells find their way into the blood stream? Two possible factors have been suggested: first, very active proliferation, and secondly, damage and even breaks in the vascular endothelium of the marrow. Hill and Duncan speculate as to whether the combination of growth pressure, together with capillary and sinus damage, permits the immature non-motile cells to be washed into the blood stream. They describe the history of a patient with carcinoma of the breast, examination of whose blood shortly before death revealed a leucocyte count of 35,000 per cubic millimetre, with large numbers of myelocytes, myeloblasts and pre-myeloblasts; also many erythroblasts. At autopsy, tumour thrombi and hæmorrhages were found in the lung, liver, spleen, suprarenal body and bone marrow; the authors suggest that their presence in the last-named situation may account for the presence of immature cells in the blood stream.

Where there is no active proliferation of immature cells in the marrow the problem of their liberation into the blood stream is even more obscure. Here again, however, injury to the endothelium by toxins, anoxæmia or chemical poisons may be a factor. The position with regard to extramedullary hæmopoiesis is interesting. Hill and Duncan describe a female patient, aged forty-six years, who entered hospital complaining of weakness, swelling of the abdomen, dyspnoea, dependent œdema and loss of weight for eight months. The red cells numbered

<sup>1</sup> *The American Journal of the Medical Sciences*, June, 1941.

1,720,000 per cubic millimetre, the hæmoglobin value was 17%. The leucocytes numbered 10,500 per cubic millimetre, and included many immature forms, some of which were myeloblasts. Nucleated red cells were also present. A sternal puncture was attempted, but no actual marrow was obtained. The patient's condition was very critical and she died two days later. Autopsy revealed the presence of osteosclerosis with extramedullary hæmopoiesis of the lungs, liver, spleen, kidney and lymph glands. The authors suggest that in such a case normal control of leucocyte release is lost because of the abnormal location of leucocyte formation. They state that in ectopic foci, such as those found in the spleen or liver, hæmopoiesis is not necessarily extravascular and, as a consequence, immature cells may easily be washed into the circulating blood.

With these general ideas in mind the authors give a classification of leucæmic reactions of myeloid type. They have adopted an arbitrary definition of a "leucæmoid picture", including any counts in which the leucocytes numbered more than 50,000 per cubic millimetre or which revealed cells at the "blast stage". In their classification the first group includes conditions in which the bone marrow is irritated or stimulated; the second is a group of "liberation" leucocytoses, usually instances of marrow response to an overwhelming demand. The third group, that of ectopic (or extramedullary) hæmopoiesis, is due to osteosclerosis or osteofibrosis, familial hæmolytic anemia, prolonged untreated pernicious anemia, tumours with replacement of the bone marrow, and lipid histiocytosis.

The actual diagnosis and differentiation of any given case from true leucæmia may be very difficult unless there is an obvious cause for the leucæmoid state. One distinguishing feature, emphasized by Hill and Duncan, rests on the fact that in leucæmoid states the immature cells are abnormal only in their lack of maturity. They do not show the atypical features of leucæmic cells, such as abnormal lobulation, indentations or clefts of nuclei, or unusual granulations. Another important abnormality of leucæmic cells not seen in leucæmoid states is the lack of correlation between the apparent age of the nucleus and the age of the cytoplasm. This distinction is probably not entirely reliable; the work of Israels, reviewed in these pages on February 15, 1941, showed that in tissue culture leucæmic cells may develop into normal cells; and Richter defined leucæmia as a condition in which the leucocytes show increased proliferation with failure to reach maturity.

It is extremely interesting to study the diverse conditions under which hæmopoiesis "goes wrong", so to speak, and much may be learnt from work such as that of Hill and Duncan. One cannot help feeling, however, that the positive side of the problem should be studied equally thoroughly. What are the optimum conditions of life for these all-important marrow cells, and how can we make sure that children have sound healthy bone marrow and a normal blood picture and a reasonable chance of maintaining these assets throughout life? The answer to this question might possibly solve the problem of leucæmia and leucæmoid states.

#### SURGICAL MASKS.

THE wearing of surgical masks by the operating surgeon and his assistants in the theatre has become so firmly established that few persons would think it necessary to question its efficacy. This is perhaps one of the reasons why such an inquiry should be made, and it is on this account that attention is drawn to a recent study by J. W. Hirshfeld and P. J. Laube, of the Department of Surgery and the Department of Bacteriology, Yale University.<sup>1</sup> Apparently Mikulicz, who wrote about the subject in 1897, was the first to suggest that the nose, mouth and beard should be covered with muslin during an operation. Masks may be placed in two large groups—a porous variety

designed to filter bacteria out of the air as it passes through them, and impervious masks to deflect the air stream away from the object to be protected. Before details of Hirshfeld and Laube's experiments are given, reference must be made to the work of Wells and his collaborators on which Hirshfeld and Laube planned their observations. Wells *et alii* showed that in air-borne infection at least two mechanisms operate. The first mechanism is concerned with droplets which vary in size from 0.1 to 2.0 millimetres and are heavy enough to fall rapidly. Since these fall rapidly to the floor, their direct range of infectivity is usually less than fifteen feet. The bacteria in these droplets are readily recovered upon exposed Petri plates. When a droplet is expelled into the air it falls to the ground with a speed that varies with several factors. Many droplets evaporate before settling to the ground and leave tiny buoyant particles of particulate matter, the droplet nuclei. It is these droplet nuclei that are concerned in the second mechanism. The mass of these nuclei is so small in relation to their surface area that they do not fall to the ground but remain suspended in the air and are wafted about for indefinite periods of time. Some of the droplets expelled from the mouth during talking are so small that they may for practical purposes be considered to be droplet nuclei. Droplet nuclei are capable of travelling great distances, and it has been held that they in all probability represent an important means of spreading infectious diseases.

Hirshfeld and Laube hold that any experiments devised to test the efficacy of face masks should be planned to record the power of the masks to prevent the passage of both droplets and droplet nuclei. In their experiments they tried to do this by using a specially constructed cabinet into which the subject put his head. Filtered sterile compressed air was admitted into the cabinet by two inlets. Petri plates were placed in the floor of the cabinet to catch the droplets. In the floor of the cabinet a connexion for a Wells air centrifuge was installed; this instrument consists of an electric motor which rotates a tube lined with culture medium. When the motor is running, the droplet nuclei from the inside of the cabinet are deposited on the culture medium of the tube. The masks tested by Hirshfeld and Laube included six types of surgical masks in common use in various hospitals. Some of these were plain six-ply or eight-ply gauze masks, and others had rubber or celluloid shields between the layers of gauze. Although they varied somewhat in design, all the masks were large enough to give adequate covering to the nose, mouth, chin and cheeks. Forty-one subjects were used, most of them more than once; they included doctors, nurses, medical students and laboratory technicians, all of whom were used to wearing masks. Fifteen minute tests were made with each subject; they consisted of (a) quiet breathing without a mask, (b) talking without a mask, (c) quiet breathing with a mask, (d) talking with a mask. Between each phase the chamber was sterilized by ultra-violet light. The bacteria recovered included *Staphylococcus albus*, *Staphylococcus aureus*, *Micrococcus catarrhalis*, *Streptococcus non-hæmolyticus*, *Streptococcus viridans*, diphtheroids, Gram-positive aerobic bacilli; no accurate records of types were kept because the study was primarily concerned with a determination of the efficiency of masks. The results, which are striking, are recorded under two headings—indirect contamination and direct contamination. The indirect contamination was that from tiny droplets and droplet nuclei picked up by the centrifuge tube. Direct contamination was that picked up by the Petri plates. Results from the use of surgical masks and industrial masks are recorded, but only the former will be considered. The average number of colonies after quiet breathing without the mask was 8 on the tube and 78 on the plates; the maximum counts were 20 and 259. After quiet breathing with the mask the number of colonies was greater, an average of 19 in the tube and 91 on the plates, with maximum readings of 99 and 315. After talking without the mask, the highest readings, as would be expected, were obtained—an average of 54 in the tube and 3,247 on the plates, with maximum figures of 337

<sup>1</sup> Surgery, May, 1941.

and 47,600. After talking with the mask the average count in the tube was 35 and in the plates 194, the maximum figures being 120 and 620.

These results are interesting for several reasons. The first point is that the number of microorganisms discharged from the respiratory tract during quiet breathing is small, and the second is that many persons discharge more organisms during quiet breathing while wearing a mask than they do without the mask. Indirect contamination was increased by surgical masks in 69% of the tests, and direct contamination was increased in 62%. It is difficult to assign a cause to this increase; Hirschfeld and Laube think that it may be due to the increased nasal secretion caused by the wearing of masks by certain individuals. Apparently they have not tried to determine whether increased secretion occurred in any of their subjects. The practical conclusion to be drawn from this work is that talking in an operating theatre must be reduced to the minimum, and if possible avoided altogether. Assistants who are not likely to have to speak should be allowed to carry out their duties unmasked. Even the surgeon and others who may have to speak can reduce their talking a great deal if they will go to the trouble of initiating a series of signs that will indicate their different requirements. The most important lesson to be learned is probably the general one that any precautions should not be looked on as 100% effective merely because it seems that they ought to be.

#### THE "FLAT" ORAL GLUCOSE TOLERANCE CURVE.

It is by no means an uncommon experience to find a patient who exhibits a glucose tolerance curve of a low or flat type. In response to the taking of a standard amount of glucose by mouth the blood sugar rises only a little—very much less than the rise of 60 to 80 milligrammes per centum that occurs in normal persons. M. J. Lepore,<sup>1</sup> of New York, in the course of a study of sprue and allied diseases, found, as others before him had found, a high proportion of patients whose glucose tolerance curve was of this flat type. It had previously been suggested that such a curve was so typical of sprue as to be of diagnostic import. To test the truth of this suggestion Lepore studied a series of 90 patients with low carbohydrate tolerance curves. The dose of glucose used for the test had been usually 100 grammes, but in a few cases one gramme per kilogram of body weight. In all 90 cases the level of the blood sugar failed to rise 40 milligrammes per centum above the fasting level during the subsequent two or three hours, and the curves were classed as low or flat. The diseases from which the patients suffered were surprisingly varied. Obesity due to over-eating, renal glycosuria, hypothyroidism and hypopituitarism, malnutrition and *anorexia nervosa* and vitamin B deficiency were found repeatedly and a number of other diseases occasionally. To this list must be added sprue, coeliac disease, Addison's disease, scleroderma, abdominal tuberculosis and destructive lesions of the hypothalamus.

Lepore arranges these conditions into three groups according to the way in which the abnormal sugar tolerance curve is produced. In the first group it is due to defective absorption from the digestive tract, in the second to rapid removal of glucose from the blood stream, and in the third to combinations of these processes. In the first group are placed coeliac disease and abdominal tuberculosis. The defective absorption in abdominal tuberculosis has been effectively demonstrated by C. Wallace Ross<sup>2</sup> in a careful study of three patients. The glucose tolerance curve after oral administration of sugar was characteristically flat. When, however, glucose in a measured dose was injected directly into the blood stream, the rise in blood sugar was excessively high and persistent. There was in fact a decreased carbohydrate tolerance,

precisely the reverse of what would be expected from a low oral tolerance curve thoughtlessly examined. The obvious explanation is that the low oral curve is the result of defective absorption from the digestive tract, and the high "intravenous curve" the true expression of an impaired sugar tolerance, which indeed is a direct result of defective alimentary absorption. The second group, in which glucose is too rapidly removed from the blood stream, by excretion, by combustion or by storage, includes renal glycosuria, hyperinsulinism, obesity from high carbohydrate diets, hypopituitarism, hypothyroidism, Addison's disease and lesions of the hypothalamus. Of renal glycosuria and hyperinsulinism, due, for example, to an adenoma of islet tissue of the pancreas, little need be written. Of high carbohydrate diets it may be said that far from decreasing sugar tolerance and causing diabetes, they increase it. This matter was discussed in our leading article on July 19, in which mention is made of the value of high carbohydrate diets in overcoming insulin resistance in the diabetic. Ross, too, lays stress on this belief, stating that "the glucose tolerance of a healthy individual is determined solely by the amount of carbohydrate the diet has contained for the period preceding the test". The importance of this factor becomes still more apparent from the fact that in no less than 28 of Lepore's cases was the flat curve considered to be due to over indulgence in carbohydrates. In Addison's disease, hypopituitarism and hypothyroidism, the low curves result from deficiencies of the insulin antagonists, adrenalin, pituitrin and thyroxin. There is some suggestive evidence that in the two last-mentioned diseases absorption from the bowel is also deficient. How the low curve is produced in lesions of the hypothalamus is not clear. It may be by pressure on the adjacent pituitary gland; but there is evidence that the hypothalamus plays a significant role in carbohydrate metabolism. In the third group Lepore places sprue, malnutrition and vitamin B deficiencies. He surveys evidence to show that in these diseases absorption of glucose from the bowel is retarded, but that glucose injected directly into the blood stream is rapidly and efficiently removed. He suggests that the reason for this in sprue is that the defect in absorption is mainly of fats, and although carbohydrates are incompletely used, the food that is absorbed is almost entirely carbohydrate and protein, and the result an efficient and rapid removal of sugar from the blood. It is reasonable to suppose that in coeliac disease precisely the same state exists, and the condition should therefore be placed in the third group.

It is obvious from Lepore's report that the finding of a flat glucose tolerance curve is interesting and significant, but not of itself diagnostic of any one disease, nor indeed of any single abnormality of carbohydrate metabolism. To determine whether the abnormal curve is produced by defective absorption of glucose from the bowel or by rapid removal from the blood stream, an "intravenous glucose tolerance test", as described by Ross and others, is the obvious procedure.

#### FUNGICIDES.

THERE are numerous so-called fungicides and there are many preparations used in the treatment of the various fungus diseases. The numbers suggest that the methods generally are ineffective. Some preparations have achieved a reputation on very slender evidence. Some medical men are too apt to prescribe a substance as a fungicide because somebody (perhaps on quite inadequate grounds) has said that it is good, or because its merits are extolled on a particularly attractive wrapper supplied by the proprietors. The value of various substances as fungicides and fungistatics was scientifically investigated by P. A. Mapleton and N. C. Dey some years ago. Their results were published in *The Indian Journal of Medical Research* of January, 1938. The fungi used in their experiments were *Epidermophyton cruris*, *Achorion violaceum*, *Achorion actoni* and *Microsporon audouini*. In the tests for fungistatic activity the substance to be investigated was mixed

<sup>1</sup> *Annals of Internal Medicine*, May, 1941.

<sup>2</sup> *Archives of Disease in Childhood*, August, 1936.



at a known dilution with Sabouraud's maltose peptone agar, which was then inoculated with small portions of a stock culture of the fungus. The results were read twenty-one days later. In the tests for fungicidal activity the substance to be investigated was added to a standard emulsion of cultured fungus at a known dilution. Culture media were inoculated from this emulsion at intervals varying from one minute to twenty-four hours. Some of the results were remarkable. For example, it was shown that salicylic acid and benzoic acid were among the weakest of the substances tested, both as fungicides and as fungistatics. This is of particular interest in view of the popularity of Whitfield's ointment in the treatment of ringworm.

Maplestone and Dey have recently extended their investigations with the object of defining exactly the dilution at which a substance failed to prevent growth of a fungus.<sup>1</sup> The same technique was applied as in their earlier experiments, except that they used a standard emulsion of fungus in the tests of fungistatic activity as well as in the tests of fungicidal activity. They consider that this method is more accurate. "Merfenil", a proprietary preparation of phenylmercuric nitrate, was the most powerful fungistatic agent against *Epidermophyton cruris* and *Achorion violaceum*; brilliant green was the most effective against *Microsporon audouini*, and acriflavine against *Achorion actoni*. Of the other dyes, basic fuchsin was weak, gentian violet and mercurochrome were rather stronger; crystal violet and malachite green were both among the most active. On the whole, the dyes were far ahead of the other substances tested. Iodine, benzoic acid, salicylic acid, paranitrophenol and quinine bihydrochloride were weak. While quinine bihydrochloride failed to prevent growth of any of the four fungi at a dilution of 1 in 1,000, a dilution of 1 in 220,000 was required before "Merfenil" failed to prevent growth of *Epidermophyton cruris*, for example. These figures are quoted to show the type of result obtained and the vast gap between the activity of the weakest and that of the strongest fungistatic substance. Of the substances that have long been used in the treatment of ringworm, iodine and mercury perchloride were the only ones to respond well to the tests for fungicidal activity. This is all the more remarkable because neither was shown to be of much value as a fungistatic agent. For a short application iodine was found to be even more effective against *Epidermophyton cruris* (perhaps the commonest fungus of the skin encountered in Australia) than the dyes gentian violet, acriflavine, crystal violet and malachite green; but if contact was maintained for twenty-four hours these dyes were more effective than iodine. "Merfenil" was by far the most powerful destroyer of *Epidermophyton cruris*, being effective in a dilution of 1 in 46,000 for one minute, 1 in 55,000 for ten minutes, and 1 in 200,000 for 30 minutes. A mixture of brilliant green and crystal violet and a mixture of brilliant green and gentian violet were the next best, in that order. Basic fuchsin, benzoic acid and salicylic acid were practically useless. "Merfenil" was the most active against the other fungi.

The results of this investigation come as quite a shock to one who has been accustomed to prescribe such substances as salicylic acid and benzoic acid in the treatment of tinea. The simple faith that most medical practitioners have in these old remedies may be one of the reasons why such large numbers of people hobble about with blistered feet during the summer months. At the same time, the results of *in vitro* experiments, such as those conducted by Maplestone and Dey, should be regarded rather as a guide to treatment than as the beginning and end of our knowledge of the various substances tested. It may well be that the warm moist skin is a better culture medium than Sabouraud's medium. It is possible to produce conditions that will render the skin less suitable for the growth of fungi without the application of fungicides at all, and in this way it is sometimes possible to eliminate a fungous disease of the skin. Furthermore, infection with a fungus is very apt to be complicated

by a bacterial invasion. Indeed Maplestone and Dey recognize this and report on the bacteriostatic activity of various substances on a strain of *Staphylococcus aureus* that frequently accompanies *Achorion violaceum*. Generally it was found that the most effective fungistatic substances were also the most effective bacteriostatic substances. Having due regard to the possible fallacies of *in vitro* experiments, we would say that the scientific tendency now in the treatment of fungous infections should be towards the application of proven fungicides, such as "Merfenil", and the alteration of local conditions so as to make the skin a less suitable culture medium. The medical man must not allow himself to be carried away by the knowledge that such-and-such a substance is deadly to fungi; he will remember, if he is wise, that he is dealing with vital tissues and that as much will depend on the response of these tissues to treatment as on the activity of the particular fungicide that he is using.

#### ARTIFICIAL INSEMINATION.

UNDOUBTEDLY one of the greatest problems the civilized world must face today is the problem of a declining birth rate. Throughout western Europe and wherever, as for instance here in Australia, life follows the pattern of Western civilization, the birth-rate is falling with alarming rapidity. The thoughtful observer cannot escape the conclusion that great and fundamental changes must take place if the race is not to die out. Mere tinkering will not solve the problem; it is a matter of changing our whole outlook on life. Still, it is interesting to realize what can be done, in selected individual cases, by medical science. In the United States of America there is a body known by the formidable title of the National Research Foundation for Eugenic Alleviation of Sterility, Inc.; Frances F. Seymour and Alfred Koerner describe a survey, made under its auspices, of the status of artificial insemination in that country.<sup>2</sup> The reader is surprised to learn how extensively this practice has been employed by medical practitioners in the eastern States of North America, and interested to read that nearly 10,000 pregnancies have been effected by its means, two-thirds by the use of the husband's semen alone. Moreover, 1,357 women had more than one pregnancy induced in this way. Seymour and Koerner state that success cannot be expected unless "a case is thoroughly worked up". By this they presumably mean, since they go on to mention the fact, that preliminary study should include, *inter alia*, the establishment of tubal patency and a determination that the endocrine system of the woman is normal. It must of course be possible to secure satisfactory seminal specimens from an acceptable source. If the specimen is not supplied by the husband, there can be no choice of donor by the family; this must be the responsibility of the medical attendant alone. The greatest success occurred in those cases in which twelve inseminations were used, 45% of the pregnancies requiring this number. The number of inseminations required varied between two and seventy-two.

The real problem, of course, is that so many marriages are unproductive, and it is a pity that Seymour and Koerner's survey was in no way concerned with the conditions that made artificial insemination necessary. If this aspect was thoroughly investigated it might be possible to prevent them. This is possibly a counsel of perfection. In an imperfect world there must needs be imperfect marriages, and the procedure surveyed by Seymour and Koerner, unnatural though it seems, has probably wrought some miracles of happiness. A childless marriage can be a major tragedy, and though we declare that the production of a healthy, well-built race is more important than the technique of artificial insemination, we can still pay a tribute to the patience and courage of those whose work is described by Seymour and Koerner.

<sup>1</sup> The Indian Journal of Medical Research, January, 1941.

<sup>2</sup> The Journal of the American Medical Association, June 21, 1941.

## Abstracts from Medical Literature.

### PATHOLOGY.

#### Acute Necrotizing Glomerulonephritis.

UNDER the heading of acute necrotizing glomerulonephritis J. Shaw Dunn and G. L. Montgomery (*The Journal of Pathology and Bacteriology*, January, 1941) describe a series of cases of a condition which is usually known as bilateral necrosis of the renal cortex. This condition is quite well known as a complication of toxemic pregnancy, but has been reported now and again to occur in males and non-pregnant females. They describe in detail eight "non-pregnancy" cases and add another seven of the more common type associated with pregnancy. On account of their histological investigations and a study of the literature, the authors come to the conclusion that the ultimate determining factor in bilateral renal necrosis is extreme glomerular capillary dilatation with loss of plasma leading to inspissation of the blood and complete circulatory blockage in the kidney at this level. This capillary dilatation may be initiated by direct action of bacterial toxins on these vessels. This results in an inflammatory process and acute necrotizing glomerulonephritis. This would account for the majority of the cases not connected with pregnancy. The capillary dilatation may be induced by partial ischemia, as in the cases of renal toxemia of pregnancy. A third occasional cause of this condition is, according to the authors, acute obstruction of the kidney veins, when glomerular engorgement may again play the same part in producing arrest of the circulation.

#### Rhabdomyomatosis of the Heart.

To the fifty odd examples of so-called rhabdomyomatosis or congenital rhabdomyoma of the heart which have been described in the medical literature, W. C. Hueper (*The American Journal of Pathology*, January, 1941) adds one which occurred in a guinea-pig. The morphology of the pathological tissue duplicated exactly that seen in rhabdomyoma of the human heart. The histological examination elicited much evidence that the rhabdomyomatous formations are not true tumours but congenital tissue malformations with blastomatoid characteristics. The question has already been raised whether this condition of the heart might not represent a myocardial variety of von Gierke's glycogen-storage disease. The author regrets that, as in many others, also in his case the demonstration of glycogen in the cells has not been possible because the tissues had been fixed in aqueous media. He points out that special attention will have to be paid to this point in the future.

R. E. OLSEN and R. J. COOPER report on the case of a male baby which died on the fortieth day of its life. At autopsy multiple nodules throughout the myocardium of both auricles and ventricles were found. Their microscopic structure was that of so-called rhabdomyomatosis of the heart. They were able to demonstrate glycogen in most of the nodules and conclude that the myocardial nodules are develop-

mental disturbances with secondary degenerative changes. They point out the frequent association of this condition with other anomalies. In their case a four-lobed right lung and generalized hypertrophy of the wall of the stomach with pyloric stenosis were found. They are of the opinion that the condition has been erroneously termed congenital rhabdomyoma or rhabdomyomatosis, and suggest as a more suitable name "congenital nodular glycogenic degeneration" of the myocardium.

#### Thrombosis of the Pulmonary Artery in Identical Twins.

THROMBOSIS of the trunk or the main branches of the pulmonary artery has been seen in a number of adults, but it has been only once, in 1897, observed in a child, a boy four and a half years of age. J. U. Gunter (*Archives of Pathology*, February, 1941) records the occurrence of this condition in identical twins, boys fifteen months of age. In the main features of their illnesses these twins were strikingly similar. Each was undernourished and each had presented feeding difficulties. With onsets which were almost simultaneous, the final illnesses of these patients were ushered in with identical symptoms, vomiting, diarrhoea and fever. In each twin respiratory embarrassment developed before death and their deaths occurred only nine days apart. At autopsy one showed acute *otitis media*, the other purulent mastoiditis. In each the right main branch of the pulmonary artery was occluded by a thrombus. It is suggested that this thrombosis probably followed embolism from small thrombosed veins in the region of the infected middle ear in one twin, in the region of the mastoid process in the other, even though such thrombosed veins were not demonstrated at autopsy. It is well known that similar simultaneous symmetric pathological processes often occur in identical twins. With regard to the case presented, the author is of the opinion that the thrombosis *per se* would seem to have no relation to heredity; but the course of events in each of the cases was, according to him, too similar and too unusual to be merely coincidental.

#### Skin Colour and Skin Cancer.

ACCORDING to Joseph Taussig and George D. Williams (*Archives of Pathology*, September, 1940) it is a commonplace in dermatological lore that skin cancer occurs more frequently in blondes than in brunettes. Supporting this impression are: (i) the extremely low incidence of the condition in the deeply pigmented races, such as Negroes and American Indians; (ii) the high coincidence with *xeroderma pigmentosum*, a disease of patients whose skin is very fair and unusually sensitive to sunlight; (iii) the fact that skin cancers most frequently occur on surfaces of the body habitually exposed to the actinic rays of sunlight; (iv) reports in the literature. As most of such evidence is based on personal judgement rather than on exact observation with instrumental aid, the authors have used a specially constructed colorimeter and have determined the colour of the forehead, the arm and the back in 100 unselected patients with skin cancer and in 100 non-cancerous hospital patients of similar age. Statistical examination of these determinations showed that the

exposed skin of the foreheads and of the arms of patients with skin cancer was on the average definitely redder and darker than that of the non-cancerous. The unexposed skin of the backs showed no such difference. Information concerning the occupations of the male subjects indicated that patients with skin cancer were more often exposed to the action of the external environment than were the controls. This suggests a probable causal connexion between exposure of skin and development of skin cancer. Subjects whose skins on unusual exposure tend to darken and redden, if they show skin cancer, more often exhibit the basal or the mixed types. Those who do not so react to unusual exposure more frequently show the squamous variety if cancer develops.

#### Osseous Findings in Chronic Renal Insufficiency in Adults.

NOW that the skeletal and renal changes which follow primary or idiopathic parathyroid hyperfunctioning are well understood, increasing attention is being paid to the fact that chronic renal insufficiency may itself be the point of departure for the development of profound pathological changes in the parathyroid glands and skeletal system. According to Arthur M. Ginzler and Henry L. Jaffe (*The American Journal of Pathology*, May, 1941), in cases of chronic renal insufficiency in adults there almost regularly occur skeletal changes consisting of more or less pronounced fibroplastic resorption of bone accompanied by a varying amount of new bone formation. The latter may occasionally be so pronounced as to result in an actual osteosclerosis, observable grossly as well as microscopically. This appears to occur in those cases in which the state of renal insufficiency is long protracted and possibly fluctuates, so that phases of bone resorption and new bone formation alternate but the latter predominates. In these cases there is also secondary hyperplasia of the parathyroid glands. While in exceptional instances this may be sufficiently accentuated to suggest that hyperfunctioning of these hyperplastic parathyroids has been a factor in the production of the osseous changes, in most cases the hyperplasia is only mild or moderate and there is no definite evidence to support the assumption of a parathyroid hyperfunction. The authors believe, therefore, that in most cases of chronic renal insufficiency in adults the osseous changes commonly found are not due to "secondary" or "renal" hyperparathyroidism, but are a consequence of the chronic acidosis induced by the renal insufficiency.

#### The Evolution of Carcinoma of the Mamma.

ROBERT MUIR (*The Journal of Pathology and Bacteriology*, March, 1941) states that two views are mostly held at present with regard to the origin of cancer, especially in the breast. The one view is that the cancer in question presents the end stage of a series of growth processes and is caused by a growth-stimulating agent, for example, a hormone in cooperation with the susceptibility of the animal. The other view is that the growth-stimulating agent causes hyperplastic growth changes up to a point, but that malignancy, when it occurs, is due to the additional action of a virus.



In order to discriminate between these two views he has given an account of the changes preceding the origin of carcinoma in the ducts and acini of the mamma. In cases in which the development of malignant disease can be traced, no evidence has been found of a dual causation, that is, of a diffusely acting hormonal agent leading to hyperplasia followed by another agent, for example, a virus, causing focal malignant change. Malignant disease is often not only of multicentric origin, but can be seen to occur gradually and to affect groups of cells in a diffuse fashion, all stages of the process being traceable. This applies both to ducts and acini. The changes found support the view that they all represent the effect of one growth stimulus and that this is of the nature of a widely acting chemical substance, such as a hormone, rather than a particulate agent, such as a virus. In a large proportion of cases of carcinoma of the breast the stages of evolution of malignant disease within ducts and acini cannot be followed, and in some of these there is evidence that malignant disease may arise *de novo* without the occurrence of preliminary hyperplastic changes. This question is, however, left an open one.

#### Hypertrophy and Hyperplasia of the Islets of Langerhans of the Fœtus and of the New-Born Infant.

EDITH L. POTTER, H. P. G. SECKEL AND WALTER A. STRYKER (*Archives of Pathology*, April, 1941) have examined the pancreas of 450 non-macerated fetuses, of premature infants and of infants born at term. They state that hyperplasia and hypertrophy of the islets of Langerhans may be found in association with maternal diabetes or may be present though the mother is non-diabetic. The condition is occasionally found in infants suffering from erythroblastosis. In the majority of cases there is no correlation between the increase of islet tissue and the severity of the diabetes, the state of control or the change in sugar tolerance of the mother during pregnancy. There is also little correlation between the amount of islet tissue found at autopsy and the blood sugar levels determined before death in those infants who succumb during the neonatal period. Thus an increased amount of islet tissue may be found in the foetal pancreas in the presence or in the absence of abnormal sugar metabolism in the mother, and in the presence or in the absence of abnormal sugar metabolism in the infant itself.

#### Pinealoma.

The term "pinealoma" is used to designate any tumour occurring in the pineal region and any neoplasm arising elsewhere in the brain, provided the origin can be traced histologically to the pineal body. The term also carries with it certain restrictions and is to be withheld from a tumour in the pineal region if the tumour is histologically not of pineal derivation. For some time the true character of newgrowths of this type was not understood. This was primarily due to the great variability in the cellular structure and to a certain inconstancy in the location of the tumours. These observations made it difficult to identify the tumours as members of the same morphological group, resulted in a multitude of interpretations of their histological character, and gave rise to a corres-

pondingly large assortment of names. But Joseph H. Globus's study (*Archives of Pathology*, May, 1941) shows that they, though often revealing divergent histological features, can be identified as members of a single neoplastic group. This identification is made possible by tracing the pineal body through the several stages of its development and matching a typical section of the tumour under investigation with that of a developing pineal body passing through a given critical histogenetic stage. Realizing that at one stage of the histogenesis of the pineal body ependymal derivatives participate in the histogenetic process and recognizing the close relationship between ependymoblasts and spongoblasts, one may reasonably assume that pinealoma may in some instances acquire the character of the spongoblastic variety of pinealoma. On the clinical side it may be pointed out that precocious development of sex characters need not be regarded as a clinical expression of pinealoma, but should be accepted as a manifestation of vegetative disturbance, resulting from hypothalamic disorder. Among other clinical features, Argyl-Robertson pupils, vegetative disorders, as somnolence, polydipsia, polyuria and ophthalmoplegias, resulting in diplopia, skew deviation and impairment of upward gaze, when added to other evidences of increased intracranial tension, point to an expanding lesion in the mid-brain region and lead to a fairly secure diagnosis of pinealoma.

#### Squamous Metaplasia of the Columnar Epithelium in the Human Cervix.

R. CARMICHAEL AND B. L. JEAFFRESON (*The Journal of Pathology and Bacteriology*, March, 1941) state that in about 40% of adult human cervixes there are more or less extensive patches of an atypical multilayered epithelium, which combines in its structure some of the characters of both normal types of cervical epithelium—columnar-celled and squamous. The structure of this aberrant epithelium varies greatly, and some of the more characteristic forms are described in detail. All varieties may be regarded as transitional stages in a metaplastic transformation of columnar-celled epithelium into squamous epithelium of vaginal type. This change in structure is accompanied by a parallel alteration in function; the secretion of mucin gradually diminishes and finally the cells begin to accumulate glycogen. Age, reproductive history and diseases of the genital tract seem to have little influence on the incidence of these metaplastic changes. The aetiology of the lesion is discussed in the light of data accumulated in the present study and of recent experimental work on the sex hormones. It is thought that both hormonal influences and local environmental factors may be concerned in its development. The possible relationship of the aberrant epithelium to cervical cancer is briefly discussed, and reasons are given for rejecting the suggestion that the lesion should be regarded as precancerous.

#### Mucinous Carcinoma of the Breast.

A STUDY by Otto Saphir (*Surgery, Gynecology and Obstetrics*, May, 1941) reveals that mucinous carcinoma of the breast is not a single entity, but can be classified into at least four definite types of tumour. The true mucinous carcinoma consists of duct or cystic

structures filled with mucinous material in which groups of, or isolated, tumour cells may still be recognizable here and there. There are no other tumour structures present. This is apparently a rare tumour, which clinically is relatively benign. The duct carcinoma with mucinous features is the most common type. Areas similar to those seen in true mucinous carcinoma are intermingled with duct carcinomatous structures. Sometimes, however, these latter portions are seen only after sections of the whole breast have been examined. These tumours are just as malignant as simple duct carcinomata. The signet ring cell mucinous carcinoma is characterized histologically by well-preserved mucin-secreting cells with basophilic or clear cytoplasm and crescent-shaped, compressed nuclei situated at the base of the cells. Whereas in the two former groups the secreting cells are soon destroyed and disappear and large spaces filled with mucin remain, in the third group the signet ring tumour cells remain intact. Soon they become isolated from ducts and acini, invade the stroma and may produce the most widespread metastases, particularly in the ovaries. Though duct carcinomatous structures may also be present in this variety, the metastases consist mostly of signet ring shaped cancer cells. This tumour is regarded as highly malignant. Two patients died from widespread metastases soon after the detection of the primary tumour. Yet one patient is alive four years after operation. The fourth variety may be designated as intracystic papilloma with mucinous features. This is a relatively rare non-malignant tumour.

#### The Aetiological Role of Chewing Tobacco in Cancer of the Mouth.

THE data presented by H. L. Friedell and L. M. Rosenthal (*The Journal of the American Medical Association*, May 10, 1941), although subject to certain limitations because of their clinical character, support the concept that chewing tobacco is an aetiological factor in the development of cancer of the mouth. A study of tobacco chewing, a practice whereby the causative factor is applied to the mucous membrane, is perhaps the most direct method of demonstrating its aetiological relation to cancer. It is agreed by practically all observers that carcinoma of the mouth develops at the point at which the quid is held, and an analysis of the history and observations made in the eight cases presented here amply corroborates such a view. The literature on betel chewing reveals further evidence that the practice of chewing tobacco may be the dominant factor in development of this type of cancer. Tobacco as a common ingredient in the betel chew has received some attention in this regard from others. It is to be noted that reports which fail to show a greater incidence of cancer of the mouth in betel chewers also fail to mention the use of tobacco in describing the preparation of the betel chew. It is unfortunate that details and statistical information on betel chewing and cancer are lacking in regions in which this is a common practice. The lesions on the inner surface of the cheek associated with the chewing of tobacco have a distinctive appearance. They are of a papillary verrucoid character, covered and surrounded by patchy areas of leucoplakia. Only moderate induration is present, and deep infiltration into the submucosal tissues is



lacking. The leucoplakic changes are probably precursors of the actual neoplasm and represent the earliest changes. This is well illustrated in two subjects who transferred the quid from one side of the mouth to the other after the developing lesions became too painful. In both instances small circumscribed patches of leucoplakia appeared at the new sites. The lesions are slow in growing and metastasize only late in the course of the disease. Histologically the tumours reveal no unusual features. They are all examples of differentiated epidermoid carcinoma. The therapy which these patients have received has been radiation. Immediate response has been excellent, although large doses were required for complete regression. It is impossible to state the effectiveness of radiation with respect to cure, since these cases have been collected in the past two years. However, all patients who completed treatment were freed of the primary lesion.

#### The Blood Sedimentation Test as a Routine Diagnostic Procedure.

THE blood sedimentation test, one of the oldest and simplest of the laboratory procedures, was reestablished as a test for pregnancy by Fåhræus in 1918. Although the specificity of the test for pregnancy was soon disproved, the procedure has received much attention since that time. It has been used most frequently as a special rather than as a routine procedure. Few authors have recorded observations based upon the routine use of the test. E. B. Agnor (*Annals of Internal Medicine*, November, 1940) reports, therefore, on a series in which the blood sedimentation test was used as a routine laboratory procedure in 2,063 unselected general diagnostic problems. A modified Westergren technique was employed; the reading at the end of one hour was considered to be a significant reading; the rate was not corrected for anemia; and a rate of more than 20 millimetres in one hour was considered abnormal. The presence of organic disease was indicated in 702 cases, or 34.1% of the series, by a sedimentation rate which was elevated. Of all the patients with definite evidence of organic disease (1,549), 43.9%, or 681, had elevated rates. Of those patients without evidence of organic disease (514), only 4.0% had elevated rates. Because certain types of organic disease produce an increase in the sedimentation rate, while other types do not, these two general types of organic disease were separately analysed. Of the patients with evidence of disease usually associated with an increased sedimentation rate, 73.5% had elevated rates. Of those with evidence of a disease usually associated with a normal rate, 11.6% showed increased rates. A normal sedimentation rate did not exclude the presence of the type of disease usually associated with an increased blood sedimentation rate. A sedimentation rate of more than 20 millimetres in an hour was indicative of organic disease of a type usually associated with an increased rate in 95% of the cases. In 226 cases, 10.9%, the blood sedimentation rate was elevated, and other routine laboratory procedures gave negative results. In only 10 of these 226 cases was no organic disease discovered. In a group of 196 patients showing anemia of less than three and a half million red cells per cubic millimetre, 37% had a normal

sedimentation rate. An elevated sedimentation rate and an elevated white blood cell count are not necessarily parallel findings. The presence of an increased sedimentation rate in males showing no evidence of disease was noted in only one case. In general, an increased rate in the male was more likely to be present with a disease usually associated with an increased rate than in the female. The blood sedimentation test performed by a simple method, without correction for anemia as an indicator of occult organic disease, is therefore considered to be of value as a routine diagnostic procedure.

#### Periosteal Fibrosarcoma.

PERIOSTEAL fibrosarcoma is, according to Martin Batts, junior (*Archives of Surgery*, March, 1941), a rather rare lesion, occurring in his series of 200 primary malignant bone tumours on 27 occasions. Approximately 75% of the lesions occurred in patients under forty years of age, the greatest incidence being in young adult life. The sex incidence was almost two to one in favour of males. The family history was not significant, nor did trauma play an important role. The average duration of symptoms before the diagnosis was established was twenty months. The outstanding symptoms were pain and swelling. The chief physical finding was a firm, deep-seated, smooth tumour without fixation to the overlying tissues, but with deep attachment to the periosteum. The lesions were single and occurred most frequently in the extremities, although approximately 25% occurred in the skull. The X-ray characteristics were those of a large soft tumour with either lytic or reactive changes in the underlying bone, the destructive changes being more common. At operation the lesion was found to be firm, generally encapsulated and white and glistening on cut section, with occasional hemorrhagic changes. Destruction of the underlying bone was usually present. The microscopic features were essentially the same as those of any sarcoma of fibrous tissue origin. The treatment consisted usually of either local excision or amputation. X-ray therapy was the usual adjunct to local excision, and for inoperable lesions was used as a palliative measure. The choice of treatment depended on the age of the patient, the location of the tumour, the extent of the osseous involvement, the presence or absence of distant metastases and the degree of malignancy noted on microscopic examination. The mortality was approximately 50% and the incidence of five-year survivals was 40%. Death was usually due to pulmonary metastases. The grade of malignancy, as noted on microscopic examination, was the most important feature in determining the prognosis. All of the patients who survived for five years or more had lesions of a low degree of malignancy.

#### Pathogenesis and Pathological Changes in Peptic Ulcer and Production of Pain.

THE studies of Jacob Rabinovitch, Bernard Pines and Ira Telcher (*Archives of Internal Medicine*, March, 1941) are based on a group of about 200 patients suffering from peptic ulcer in whom pain was the outstanding symptom. They come to the conclusion that focal gastritis and erosions are

most closely associated with the primary aetiology. This leads in its latter course to focal nerve irritation and arteritis, vaso-spasm, muscle spasm, ischemia and necrosis. Pain is, according to them, caused by ischemia produced as a result of vascular occlusion and contraction of the gastroduodenal musculature. In ischemic lesions there is a tendency for accumulation of acid radicles, which are known to irritate nerve endings. Inflammatory exudate is another source of pain. The interstitial tension developed in many inflammatory swellings may act to compress and distort pain endings to the point of stimulation. Furthermore, pain endings are highly sensitive to the potassium ion, and the latter is found in increased amounts in inflammatory exudates. To what extent the increased gastric acidity plays a part in the causation of pain remains open to question. The most important factor for pain and peptic ulcer is the local perineuritis which is of common occurrence in this condition.

#### Effect of Liver Therapy on Pathways of the Spinal Cord in Subacute Combined Degeneration.

CHARLES DAVISON (*Archives of Internal Medicine*, March, 1941) has been able to perform post-mortem examinations on 10 of 69 patients who had suffered from pernicious anemia with subacute combined degeneration of the spinal cord and received early and intensive liver therapy. The subjective neurological symptoms became less pronounced in all cases except one. Improvement in the objective neurological signs was observed in only three cases. The pathological process in these instances was not so noticeable and the myelin sheaths and axis cylinders were not so extensively destroyed as in cases in which no treatment or only mild treatment had been carried out. In five of these ten cases the degeneration, instead of involving the postero-lateral tracts, was limited to the posterior columns and rarely invaded the pyramidal pathways. Even in the other five cases the pathological changes were most marked in the posterior columns. In all instances there was a progressive glial change (gliosis), which was most pronounced in the posterior columns. This type of gliosis was not observed in the cords of patients with subacute combined degeneration who did not receive liver therapy. By the early and adequate parenteral administration of liver extract, cessation and reduction in the swelling of the myelin sheaths can be accomplished, further destruction of the axis cylinders being prevented. The function of the axis cylinders can thus be restored, provided they are not completely destroyed. This form of treatment also induces glial productivity.

#### MORPHOLOGY.

##### Betz Cells and the Pyramidal Tract.

A. M. LASSEK (*The Journal of Comparative Neurology*, April, 1941) counted the giant (Betz) cells in the total motor cortex of four monkeys. He found an average total of some 18,845 cells of this type. Approximately 52% occurred in the upper third of the area, 33% in the middle third, and 15% in the lower third; this compares with

74%, 20% and 6% found in the corresponding regions of the human brain. Thus in both, but particularly in man, the greatest incidence of giant cells falls in the area devoted to control of the inferior extremity, while the region concerned with the superior extremity is poorly endowed. This does not agree with the relative motor control of these limbs. The fibres in the pyramidal tract were counted in sections just above the decussation. In the monkey they averaged 554,000, or 191,800 per square millimetre. Thus there is a great discrepancy between the number of fibres and the number of cells from which the fibres are supposed to arise. Moreover, the great majority of the fibres in the pyramidal tract are small. The author concludes that the Betz cells of area 4 contribute only a fraction to the pyramidal tract, and he criticizes conclusions based upon the Marchi method of tracing retrograde degeneration.

#### Mechanics of the Human Foot.

R. L. JONES (*The American Journal of Anatomy*, January, 1941) has reinvestigated the problem of the arches of the foot and the proportional responsibility of ligaments and muscles. He employed partly dissected legs with springs substituted for the muscles, and made observations upon living subjects. Apparatus was devised (i) to apply weight to the tibia, (ii) to apply tension to the springs, and (iii) to register distribution of load between the heel and ball of the foot. From his observations the author concludes that the deep posterior tibial muscles and the *peroneus longus* are relatively unimportant as plantar flexors, and that they do not bear more than 15% to 20% of the total tension stress of the longitudinal arch. The greater part of the longitudinal tension stress is borne by the plantar ligaments assisted by the short plantar muscles. Distress or flattening of the longitudinal arch depends less upon the magnitude than upon the duration of the stress. A fallen or flattened longitudinal arch cannot be raised by muscular action, and commercial devices have little value as arch supports. The stress on the longitudinal arch is directly proportional to the pressure upon the ball of the foot; here weight distribution follows a definite pattern which is related to the architecture of the foot and may be changed by muscular action which shifts the weight from the first to the lateral four metatarsals and *vice versa*. The invertor and evertor muscles of the foot preserve a relative constancy in this ratio of weight distribution by reflex contraction to compensate factors which might tend to alter the ratio.

#### Gower's Tract and Anterior Horn Cells.

SYBIL COOPER and C. S. SHERRINGTON (*Brain*, June, 1940) have discovered experimentally a new source for fibres ascending in the tract of Gower. The experiments were performed on monkeys and cats, and comprised hemisections and transections of the spinal cord in the cervical and thoracic regions. In addition to the usual chromatolysis of cells in Clarke's column below the lesion, and chromatolysis of cells in the red nucleus, nucleus of Deiters and bulbar and pontine reticular nuclei above the lesion, the authors found constant chromatolysis of cells at the antero-lateral border of

the anterior horn below the lesion. The affected cells were indistinguishable from the ordinary "motor" cells of the anterior horn, they were restricted to the segments from the twelfth thoracic to the sixth lumbosacral, and were always contralateral, their axones apparently crossing immediately to the opposite tract of Gower. These border cells, which are totally unlike the cells of Clarke's column, appear to carry on below the point where Clarke's column stops. As a further observation the authors report a crossed descending tract arising from large cells in the medial part of the anterior horn at the second cervical level.

#### Duodenal Diverticulosis.

J. L. WIERDA (*The Anatomical Record*, January, 1941) describes a case of duodenal diverticulosis found *post mortem* and discusses briefly the incidence and aetiology of the condition. Diverticula are seen radiographically in about 2% of cases; they are commonest in women and usually occur during the second half of life. They may be congenital or acquired. If congenital, they have the same walls as the remainder of the duodenum; if acquired, they are composed only of the mucous and submucous layers. The diverticula are found most commonly in the second part of the duodenum, where the preference may depend upon weakness engendered by the entrance of the bile and pancreatic ducts and blood vessels. In the author's case there were five diverticula in a woman who had a tumour of the pyloric region. The two largest diverticula were situated on the medial border of the second part, the remaining three on the inferior border of the third part. They were of the acquired type, projecting through the circular and longitudinal muscular layers; the mucosa showed no circular folds, but there were villi and crypts of Lieberkühn in all and glands of Brunner in one—the *muscularis mucosae* was three to five times as thick as normal. The diverticula bore no particular relation to the duodenal papilla, but their situation was in line with the entrance of numerous large blood vessels in their respective situations.

#### Chevron Bones in the Human.

A. H. SCHULTZ (*The American Journal of Physical Anthropology*, March, 1941) records the occurrence of a chevron bone (hæmapophysis) on the ventral aspect of a sixth sacral vertebra in a Negro of twenty-five years. The condition is extremely rare in the adult, only four previous cases having been recorded; but cartilaginous chevron bones are commonly found in the human embryo and fetus. At the fifth to sixth week they appear as cartilaginous arches on the ventral aspect of the coccyx, and the median sacral artery runs under them. They usually disappear before the twenty-millimetre stage is reached.

#### The Palmar Spaces.

M. GRODINSKY and E. A. HOLYOKE (*The Anatomical Record*, April, 1941) have studied the palmar spaces, fasciæ and the tendon sheaths in 92 human hands. They employed injection, section and dissection, and their results led to some criticism of the findings of other authors, particularly Kanavel. The middle palmar space was not found to be single, as described by Kanavel;

instead it is subdivided by connective tissue septa separating the tendons to individual fingers. These septa extend proximally to the distal end of the common flexor sheath (ulnar bursa); above this level the space is undivided. The lumbrical tendons leave the dorsal aspect of the flexor sheath and carry extensions of this with them. According to the authors, the thenar space of Kanavel is really the adductor space, lying between the oblique septum and the *adductor pollicis*; the true thenar space, they claim, is that described by Poirier—the intermuscular space of the thenar eminence. Similarly, the hypothenar space is the intermuscular space of the hypothenar eminence. While the fibrous tendon sheaths of the digits extend to the base of the distal phalanges, it is probable that the inner serous sheaths do not extend beyond the distal interphalangeal joints.

#### Thyroid Activity.

E. DE ROBERTIS (*The American Journal of Anatomy*, May, 1941) has investigated colloid distribution in the thyroid gland. He used both normal rats and those activated by the thyrotropic hormone of the pituitary, and to avoid the formation of artefacts employed a "freezing-drying-denaturing" method which fixed the thyroglobulin *in situ*. In the thyroid cells the author found no chromophobe vacuoles, but there were plenty of colloid droplets. The colloid may be at the apex or the base of the cell, or in between, or completely loading the cytoplasm. The intra-follicular colloid is homogeneous, not vacuolated, as usually described. Secretion in the thyroid cells generally commences at the apical side of the nucleus and moves towards the lumen of the follicle, the droplets enlarging meanwhile; but the cells may secrete towards the base, especially when very active. Colloid release appears to occur by transport through the cells, not between them. Thyrotropic stimulation produces (i) increased intracellular colloid with secretion towards both poles (three hours), (ii) inhibition of secretion and activation of release of intra-follicular colloid (twelve to twenty-four hours), (iii) simultaneous increase of secretion and transcellular release (five to ten days). Although activation may produce pseudo-follicular diverticula, there is no true formation of new follicles.

#### Double Mandibular Condyles.

A. HRDLÍČKA (*The American Journal of Physical Anthropology*, March, 1941) reports the occurrence of doubling of the human mandibular condyles. The author has collected 12 cases of more or less complete division of the condyle and 11 others with a tendency towards this condition. The anomaly is usually unilateral, but it may be bilateral, and there is a slightly greater incidence in the female. Apart from human specimens the only other primate to show the condition was a single gorilla. The doubling varies from a slight antero-posterior grooving to an almost complete separation into two subcondyles. There are often corresponding changes in the articular fossa, and sometimes some arthritic tendency. Of the cases reported, six were European, nine came from the North American continent (ranging from Indians to Eskimos), three were from Peru, two were Chinese and one Mongolian. The change has not been observed in African or Oceanic blacks, or in Australians.



## British Medical Association News.

### SCIENTIFIC.

A MEETING of the Western Australian Branch of the British Medical Association was held on April 16, 1941, at the Perth Hospital, Dr. J. A. LOVE, the President-Elect, in the chair. Dr. Aitmann and Dr. Dunstone, of the Air Recruiting Centre, were present by invitation.

#### The Medical Examination of Recruits.

DR. A. B. ANDERSON read a paper entitled "Problems in the Medical Examination of Recruits" (see page 108).

DR. G. R. TROUP read a paper entitled "The Medical Examination of Army Recruits" (see page 110).

DR. L. A. HAYWARD spoke of the different standards which had been laid down for recruits for the Australian Imperial Force and for home service, and also stressed the importance of making an accurate record of all scars at the time of examination.

DR. F. L. GILL stressed the importance of taking full advantage of the experience and knowledge gained by medical officers of the Repatriation Department in dealing with casualties from the war of 1914-1918. He urged in particular the importance of making detailed inquiry when a recruit gave a history of head injury or of digestive symptoms.

DR. C. W. COURTNEY agreed with the remark of Dr. F. L. Gill that much knowledge had been gained as a result of the experience of the Repatriation Department in connexion with the 1914-1918 war. Time did not permit the matter to be dealt with fully at the meeting, but several points had been raised which called for brief comment from the repatriation aspect.

Whilst the primary object of the medical examination of a recruit was to determine his fitness for service, it was also important both to the Commonwealth and to the recruit himself that his medical history and condition at the time of enlistment should be fully and accurately recorded for future reference, particularly in connexion with claims for compensation. The details of medical history were set out in A.A. Form D.1; but it was surprising that this contained no reference to digestive disorders, the incidence of which in the British Army was receiving considerable attention, and which had been cited by Major Troup as a fairly common cause of invalidity. In a local case which had come to Dr. Courtney's notice, an ex-soldier of the previous war was accepted for home service, and ten days after enlistment had a fatal haematemesis. The history of gastric ulcer (from which he had suffered for some time, according to Repatriation Department records) had presumably not been elicited at the enlistment medical examination, not being covered by any of the questions set out in A.A. Form D.1. Dr. Courtney pointed out that that case illustrated another point, namely, the possibility of being misled in the estimation of the fitness of an applicant by the rate of war pension payable; this information was obtained from the Repatriation Department by the Army and recorded on A.A. Form 203 (modified), "Application for Enlistment for Home Service". The pension rate was frequently the least important of the information possessed by the Repatriation Department concerning an ex-soldier's disabilities, the more serious of which were often non-pensionable. In the case quoted, a small pension was payable in respect of "Pul. Fibrosis"; but the records contained full information concerning the gastric ulcer, which was non-pensionable. A low pension rate, therefore, should not be regarded as implying the absence of any serious disability. On the other hand, a relatively high pension rate did not necessarily indicate a corresponding degree of unfitness; for example, a man in perfectly sound health might be receiving a pension in respect of certain specific injuries, which would not debar him from suitable employment in the forces. For these reasons, reference to Repatriation Department medical records (which were available to the services) was advisable.

Types of disabilities which had been mentioned served to illustrate certain provisions of the Repatriation Act which might with advantage be borne in mind in the estimation of the compensation "risk" of a prospective recruit for service at home or abroad. Under the act, aggravation of a pre-enlistment disability would be pensionable only in the case of a person who served overseas, or who, having enlisted for service overseas, had served in camp in Australia for at least six months. A distinction was also drawn between incapacity directly attributable to service, in respect of which all members of the forces were eligible

for compensation, and incapacity resulting from any event occurring during the period of service, in respect of which only those who served overseas were eligible. This distinction might be exemplified by the case of renal calculus which had been mentioned; the formation of a calculus in a person predisposed to it would not, generally speaking, be "directly attributable to service", but it might be described as "an occurrence happening during the period of service".

In reply to a question by Dr. Frank Gill concerning "D.A.H." in ex-soldiers, Dr. Courtney said that this was a big subject, with which he would not attempt to deal at the moment. He would, however, emphasize the fact that "D.A.H." was not a cardiac disability, but a nervous one. The failure of medical examiners in the past to realize this fact and to treat such cases accordingly had been largely responsible for the fixation of the disability and had given rise to difficulties and misunderstandings in later years.

The experience of the Repatriation Department had shown that the medical examination of recruits in the war of 1914-1918 was not always satisfactory, and many difficulties had arisen from the lack of detailed records of medical history and clinical findings at the time of enlistment. It was therefore pleasing to learn from the interesting papers which had been read, that greater attention was now being given to these matters.

DR. ALAN STOLLER said that he was not so certain as the other speakers that the best job was being done. An excellent effort was being made to minimize invalidism and to turn out the best physical specimens. Yet, although the perfect "animal" was being chosen, except in the case of the Royal Australian Air Force no effort was being made to assess mental characteristics. An appreciation of these would not only help in the early recognition of signs of mental disorder, but would also be an additional guide to promotion. Dr. Stoller had been informed that the Germans had psychologists attached to the various units of their armed forces, who were concerned with personality and intellectual assessments.

Simple intelligence testing, such as the United States of America carried out in the last war with their Group A and B tests, would take up little time; several hundred subjects could be examined in one hall in an afternoon, during which time personality schedules could also be filled out. In any case of doubtful mental stability a skilled psychiatrist would often elicit valuable data from the history, and this would help to prevent the disadvantages of the existent state of affairs, with invalidism from mental causes reaching its present high level. Modern warfare produced an unduly great strain on the mind, and if they were going to continue to neglect the lessons of mental hygiene they would have an increasing number of psychiatric casualties. It was well known that in the last war mental disabilities were second in number only to surgical ones.

DR. M. K. MOSS expressed agreement with Dr. Stoller's remarks and uttered a warning against the acceptance of men of neurotic habit.

DR. J. M. O'DONNELL said that as the result of seeing at the Lucknow Military Hospital patients with skin disorders, he had come to the conclusion that recruits who gave a history of *acne indurata*, with abscess formation on the back of the neck, should be carefully examined for evidence of chronic suppurating sinuses and similar conditions. He had found that a number of these men had spent most of their ninety days' camp attending hospital for incisions, dressings *et cetera*.

Service conditions (dust, sweating *et cetera*) and army diet seemed to cause a "flare-up" in subcutaneous retention cysts and such conditions. Dr. O'Donnell thought that these men should be "stood down" for six months as temporarily unfit till discharging sinuses had cleared up. He had seen a number of men who were suffering from allergic dermatitis, some being sensitive to khaki clothing, socks *et cetera*. A number of these men admitted having had attacks before joining the armed forces; some had not admitted it on the questionnaire filled in at the time of their medical examination, as they had thought that the words "skin disease" referred to such things as bad acne, weeping eczema, scabies, syphilis *et cetera*, and that it did not cover such conditions as "irritation from cement", "irritation from dyes", "hay itch", "weed dermatitis" *et cetera*. If these men had been asked whether they had ever had any skin disease or skin irritation, the answer would probably have been that they had never had any skin disease, but that they had had several attacks of skin irritation, from contact with some external irritant. Dr. O'Donnell thought this an important point from the pension aspect in the future.

A number of men with previously symptomless plantar warts had been observed. If plantar warts were present, they should be dealt with before the man was accepted,



as they could cause great incapacity under service conditions when heavy boots were worn. Ringworm of the feet had not often been a cause of incapacity, owing to the routine anti-tinea methods adopted by the medical officers of the different units. A number of cases of sycosis had been observed in men who had previously had a history of "barber's rash". If a recruit showed even mild sycosis, he should be accepted with caution or marked temporarily unfit, because in most cases of sycosis a deleterious light sensitization influence was present. Exposure to the sun and wind and army diet were almost certain to cause a flare-up in quiescent sycosis. A number of rodent ulcers had been seen; the ulcers were present before the men joined the Army and had been overlooked at examination. A large proportion of the patients seen at the skin clinic at the Lucknow Military Hospital were suffering from skin sepsis, scabies *et cetera*.

Dr. J. J. HOLLAND suggested that the work of fitting for service men with remediable defects should be carried out at the expense of the nation.

Dr. COLIN ANDERSON reminded members that the duties of men in the garrison battalions were much more arduous than they were generally supposed to be, and that a reasonably high standard of fitness was essential for recruits for these units.

Dr. DUNSTONE gave an interesting description of the reasons underlying the arbitrary height and weight standards for pilots and air gunners in the Royal Australian Air Force.

Dr. J. A. LOVE, from the chair, proposed a vote of thanks to the speakers.

A MEETING of the New South Wales Branch of the British Medical Association was held on June 19, 1941, at the Royal North Shore Hospital of Sydney. The meeting took the form of a number of clinical demonstrations by members of the honorary medical staff.

#### Addison's Disease.

Dr. S. D. ALLEN showed a married woman, aged forty-five years, who had been admitted to hospital on March 19, 1941. She had had progressive pigmentation of the skin for the past two years and weakness for the past year, which had terminated in an attack of collapse on December 21, 1940, since which the patient had been confined to bed. She had also had intermittent attacks of vomiting, and had lost approximately one stone in weight in the past six months. She also suffered from breathlessness and palpitation on exertion. She had had no previous illnesses or operations, and there was nothing of note in her family history.

On examination the patient was seen to be a thin woman; general deep pigmentation of the skin was present, most pronounced on the face, the hands and forearms, the areolæ, the axillæ and over the scapulae. Pigmentation was present also on the tongue and the mucous membrane of the mouth. The conjunctivæ were not affected. Scattered areas of leucoderma were noted on the face, neck and forearms. The pulse was regular and of small volume, and the rate was 120 per minute. The blood pressure was 105 millimetres of mercury systolic and 55 diastolic. The apex beat was heard in the fifth intercostal space, four inches from the mid-line; the heart sounds were of moderate intensity and there were no murmurs. The chest was bilaterally symmetrical and moved evenly; it was resonant on percussion. The breath sounds were normal, vesicular in type, and no accompaniments were heard. The patient had five teeth only, in the lower jaw. The tongue was coated and patchily pigmented. No tenderness or tumefaction was noted in the abdomen. The liver, spleen and kidneys were not palpable. No abnormality was detected in the central nervous system. The urine was acid. An X-ray examination revealed no lesion in the chest; in the abdomen no calculus was seen, but there was an irregular shadow in the left suprarenal region, which was thought to be due to possible calcification. The sodium content of the blood serum was 300 milligrammes per 100 cubic centimetres; the chloride content of the blood was 514 milligrammes per 100 cubic centimetres, and the sugar content of the blood was 0.12%.

After a preliminary period of rest and the exhibition of sodium chloride by mouth in doses of 7.5 grammes per day, treatment with "Percorten" ("Ciba") was begun; 5.0 milligrammes were given every second day. There was a gradual and progressive rise in the blood pressure to 145 millimetres of mercury systolic and 90 diastolic, with a corresponding gradual return of physical strength, until on May 5 the patient was able to walk by herself. Stabilization was produced with an average daily dose of 2.5 milligrammes of "Percorten" and 7.5 grammes of sodium chloride. At this

time the sodium content of the serum was 318 milligrammes per 100 cubic centimetres and the chloride content of the blood was 475 milligrammes per 100 cubic centimetres; the sugar content was 0.09% and the urea content of the blood was 12 milligrammes per 100 cubic centimetres. A further X-ray examination of the chest was made; no changes were seen in the lung fields, but the cardiac shadow looked larger. However, without a teleröntgenogram measurements were inaccurate.

On May 27 Dr. Basil Riley implanted 500 milligrammes of compressed "Percorten" in the subcutaneous tissue at the inferior angle of the left scapula. Each tablet consisted of 100 milligrammes. Dr. Allen expressed his indebtedness to the firm of "Ciba" (Sydney), which had specially compressed these tablets and donated them. Healing was by first intention. At the time of the meeting the patient's skin was not so deeply pigmented; she was able to walk short distances and was gradually regaining further strength.

#### Myotonia Atrophica.

Dr. Allen also showed an unmarried male patient, aged twenty-one years, who had no occupation and who had first attended the out-patient department complaining of pain in both hands at times, of difficulty in performing finer movements, although all movements were clumsy and weak, of inability easily to relax the grasp, and of somnolence.

On examination the patient was seen to have recession of the hair at the temples. Both eyelids were drooping and the lips were prominent. Speech and response were slow and the voice lacked intonation; the smile was slow in appearing and fading. The sterno-mastoid muscles were smaller than normal and the neck muscles generally were under-developed; no other muscular abnormality was detected. Both testes were smaller than normal, the left particularly so. Examination of the eyes revealed no cataract. No abnormality was detected in the nervous, respiratory, circulatory and alimentary systems. Neither the Wassermann test nor the Kahn test produced a reaction. The serum calcium content was 10.8 milligrammes per 100 cubic centimetres, and the phosphorus content of the blood was 5.7 milligrammes per 100 cubic centimetres.

On September 20 treatment with quinine was begun; 15 grains per day were given by mouth, and some improvement occurred in the patient's ability to relax his grasp. The dose of quinine was increased to 25 grains per day, and further slight improvement occurred; but some difficulty still remained, especially after repeated efforts at grasping and relaxing.

Dr. Allen remarked that the patient's family history did not suggest the presence of *myotonia atrophica* or cataract in his parents, grandparents, uncles or aunts. One brother, aged fourteen years, had, however, been found to have the earliest signs of the same condition.

#### Lymphogranuloma Inguinale.

Dr. STUART STUDDY discussed the history of a married female patient, aged twenty-nine years, who had been admitted to hospital on November 19, 1940. She had had intermittent pain in the left iliac fossa for three weeks and a yellowish coloured discharge from the vagina for nine months. The pain was aggravated by the menstrual periods. There were no urinary symptoms.

Examination revealed tenderness in the left iliac fossa and a tender mass in the left fornix; oedema of the pudendum and apparent hypertrophy were also present. The menstrual history was normal, except that the patient had always suffered from slight dysmenorrhœa.

On November 20 many pus cells, but no gonococci, were found in smears from the cervix and the vagina. On December 4 microscopic examination of biopsy material from the labium gave the following information. There was hyperplasia of the squamous epithelium, which was thrown up in folds. The underlying tissue was oedematous, and lymphatic spaces filled with fluid were conspicuous. Foci of inflammatory cells (lymphocytes and plasma cells) were plentiful. The histological appearances were suggestive, but not diagnostic, of *lymphogranuloma inguinale*. On December 11 the Wassermann test, the Kahn flocculation test and the Neisserian complement fixation test produced no reaction. On December 21 the intradermal injection of Frei antigen produced a reaction. The patient was discharged from hospital.

She was again examined at the out-patient department on January 3, 1941, when she no longer complained of pain. The labia were not so much thickened, but they were tender. Examination revealed pronounced progressive stenosis of the rectum, but the patient said that she had no difficulty in defæcation. The menstrual periods occurred regularly every twenty-eight days, and lasted for only one day. The patient did not return for examination.

### Ovarian Pregnancy.

Dr. Studdy also discussed the history of a married female patient, aged twenty-five years, who had been admitted to hospital on February 17, 1941. She had had a discharge *per vaginam* for four months. For one month she had had severe pain in the left iliac fossa, so severe that she was unable to use her left leg. Her appetite was poor and she was constipated. She had had difficulty in micturition two weeks previously, but this was not present on her admission to hospital. Morning nausea had been present for one week. Her last menstrual period had occurred on February 2, ten days early. The menstrual periods were irregular, but mostly occurred every twenty-eight days and lasted for seven days; the last period had been accompanied by pain. She had had a miscarriage four months earlier, at two and a half months' gestation; curettage was not performed. She had two children, the elder aged three years, the other aged twelve months.

Examination revealed a tender mass in the left fornix. On February 19 the urine was found to contain many pus cells, but attempts at culture produced no growth of organisms.

At operation, cervical erosion, thickened endometrium and a tubo-ovarian mass on the left side were found; the right tube and ovary were normal. Appendicectomy, left salpingo-oophorectomy and curettage were performed, and diathermy was applied to the cervix.

On February 25 the pathologist's report on the cystic ovary and Fallopian tube was received. The Fallopian tube and ovary were congested and had been found to contain groups of inflammatory cells. The ovary contained some simple follicular cysts. A large cyst seen macroscopically contained some amorphous material, in which chorionic villi were present. The tumour was an ovarian pregnancy, and no decidua reaction was recognizable in the surrounding ovarian tissue. It was pointed out that this was usual in ovarian pregnancies. On March 8 the patient was discharged from hospital, well.

### Ruptured Gravid Uterus.

Dr. Studdy then discussed the clinical history of a married female patient, aged thirty-five years, who had been admitted to hospital on June 29, 1940, at 11.10 a.m. She was approximately six and a half months pregnant and was not in labour. She had had severe abdominal pain at 7 a.m., followed by a fainting attack. The pain had persisted.

Examination revealed that the patient was pale and suffering from shock; the pulse was rapid and thready, and the blood pressure was 60 millimetres of mercury systolic and 30 diastolic. The uterus was enlarged to the size of a twenty-eight to thirty weeks' pregnancy. Tenderness was present and the fetal heart was not audible.

The patient had had a similar attack one month before. This was her second pregnancy; she had one child, aged eighteen months. The previous pregnancy had gone to term, and the presence of *placenta previa* with a contracted pelvis had led to the performance of a Caesarean section. When the patient was seen on June 20 at the prematernity clinic she had been experiencing pain over the whole body, chiefly in the right lower quadrant of the abdomen. She had previously undergone appendicectomy. When she was examined at the prematernity clinic her systolic blood pressure was 124 millimetres of mercury and her diastolic pressure 74. Her last menstrual period had occurred on December 16, 1939.

On June 29, 1940, the patient had a subnormal temperature and an increased pulse rate. The cervix admitted the tip of the finger. After dilatation the membranes were ruptured and drainage of one ounce of liquor followed. A blood count gave the following information: the erythrocytes numbered 2,700,000 per cubic millimetre and the haemoglobin value was 49%. A transfusion of 600 cubic centimetres of citrated blood was given, followed by an infusion of two pints of saline solution; three more pints of citrated blood were then given.

On June 30 laparotomy was performed. It was found that the uterus, at about six months' gestation, was ruptured along the line of the old Caesarean section scar. There was much blood in the peritoneal cavity, and a dead six months' fetus was found. The fetus and placenta were removed and the uterus was oversewn along the rupture. The patient was sterilized.

On July 1 she was vomiting continuously; abdominal distension, mainly gastric, was present. Ryle's tube was passed, and the stomach was aspirated and washed out. Vomiting ceased at 2 p.m. The temperature reached 103° F.; the next day it fell to 102° F. On July 3, at 6.30 a.m., the patient had a rigor; her temperature was 105° F. and her pulse rate 140 per minute. A blood count revealed that the erythrocytes numbered 2,600,000 and the leucocytes

16,900 per cubic millimetre. Treatment with "Proseptasine" was begun, four tablets being given at once and two every four hours. On July 5 her temperature was 101° F.; the transfusion of three pints of blood was begun. On July 6 blood culture produced a growth of *Staphylococcus aureus haemolyticus*. On July 7 the temperature subsided. On July 11 a blood count revealed that the erythrocytes numbered 4,000,000 and the leucocytes 21,000 per cubic millimetre. On July 18 no organisms were grown on attempted culture from the blood, and the number of leucocytes had fallen to 9,300 per cubic millimetre. On July 24 an X-ray examination revealed possible early consolidation at the bases of both lungs. On July 29 her temperature was normal, her urine was sterile and no abnormality was detected in the lungs.

### Plastic Surgery.

DR. BASIL RILEY showed four patients to illustrate the use of the tubed pedicle graft. The first was a boy, aged fifteen years, who had had his left arm amputated after a gas gangrene infection complicating a compound fracture. The stump was unhealthy, devoid of skin covering and unsuitable for the application of an artificial limb. A thoraco-epigastric tubed pedicle was formed and migrated to the stump, with the production of a generous cushion-like covering suitable for an artificial limb.

The second patient was a man, aged seventy-three years, whose lower lip was the seat of an epithelioma in 1938. This was eradicated by radium. The resulting destruction, which was associated with continuous dribbling of saliva, was repaired by the use (a) of the upper lip, by means of a modified Estlander's V advancement, and (b) of a left oblique cervical tubed pedicle graft. In spite of the patient's age, the irradiation and his concurrent diabetes, these procedures produced a satisfactory result.

The third patient was a woman, aged forty-four years, who had a large squamous epithelioma of the face following X-ray treatment twenty-two years earlier. Ulceration involving the entire lower lip and malignant infiltration of half of the upper lip, the chin and a large area of the left cheek necessitated extensive endoscopic resection. A left acromio-pectoral tube pedicle graft was used to replace the lost tissue.

The fourth patient, a man, aged forty-one years, had completely lost his right ear in a motor car accident. A post-auricular skin flap was raised and a piece of cartilage (removed from the seventh costo-chondral junction) was embedded behind the flap, which was replaced and sutured. One week later a right oblique cervical tube pedicle graft was raised. Dr. Riley explained that his intention was later to migrate this graft to form the helix, and a Thiersch graft would be required to cover the denuded area. He showed by means of models and photographs the various operative procedures in the reconstruction of the ear, and the special instruments and materials required were exhibited.

### The Patch Test: A Simple Tuberculin Test for General Medical Practice.

DR. DOUGLAS ANDERSON exhibited some spools of adhesive strapping to which tuberculin "patches" had been applied. He explained that the patch test was used to determine whether children who had been exposed to infection by tubercle bacilli had actually become infected. He said that he had himself made the patches shown and that they could be made at home easily and cheaply. The method was to soak filter paper in tuberculin and dry it, cut it into pieces one centimetre square and apply it to adhesive strapping.

Dr. Anderson said that the patch test obviated the making of dilutions of tuberculin, which were not stable and had to be administered by injection. It was necessary simply to cut a patch off the spool and stick it on the medial aspect of the arm. The patch was removed after forty-eight hours, and the site of application was examined after another forty-eight hours. A reaction to the test consisted of a milialy or confluent eruption where the patch was in contact with the skin. In the case of children, failure to react to the patch test was almost as good evidence of the absence of tuberculous infection as was failure to react to the Mantoux test. A reaction to the test by a child should lead to an examination of the parents for tuberculosis.

### Unclassified Anaemia, Possibly Due to a Chronic Infective Process.

DR. A. E. ASPINALL showed a male patient, aged seventy years, suffering from anaemia of hyperchromic type, which did not respond to treatment with liver extract. The blood picture was difficult to interpret, and the diagnosis was

thought to lie between chronic leucæmia and disturbance of hæmatopoiesis by some chronic infective process, such as subacute bacterial endocarditis. The former was excluded, in the opinion of Dr. Marjorie Little, by the results of the examination of a smear of the sternal bone marrow, in which the distribution of the leucocytes was as follows: neutrophile cells, 30%; band forms, 11%; metamyelocytes, 18%; myelocytes, 21%; myeloblasts, 4%; lymphocytes, 14%; monocytes, 2%. A reaction of this character was thought to be compatible with the presence of a chronic infective process, and frequent rises in temperature and the occurrence of emboli in the fingers and toes suggested that this process might be subacute bacterial endocarditis.

#### Sarcomatous Degeneration in Paget's Disease of Bone.

DR. A. R. HAMILTON showed a male patient, aged seventy years, who had been admitted to hospital on May 25, 1941, complaining of pain and swelling in his left knee of nine weeks' duration, and of increasing pain and stiffness in his neck, with inability to use his left arm for a period of several months. There was no history of trauma to the knee or of any other joint disability. He had had occasional headache, but not of great severity.

On examination his knee was found to be irregularly enlarged and very tender; a flexion deformity of the knee joint was present. The swelling was hard and suggested bony enlargement. There was very little movement in the cervical vertebrae and the muscles of the left arm were wasted. There was no bowing of the extremities.

X-ray examination revealed localized Paget's disease in the lower end of the femur, with an area of erosion on the articular surface greatly suggestive of sarcomatous degeneration. X-ray examination of the cervical vertebrae revealed some fusion, with advanced arthritis and calcification, probably causing interference with the nerve supply to the muscles of the left arm. The flexion deformity of the left knee was corrected, with some relief of symptoms, by immobilization in a Thomas's knee splint, and deep X-ray therapy was instituted for the bone lesion. Subsequent X-ray examination revealed Paget's disease of the parietal region of the skull.

(To be continued.)

### Medical Societies.

#### THE MEDICAL SCIENCES CLUB OF SOUTH AUSTRALIA.

A MEETING of the Medical Sciences Club of South Australia was held at the University of Adelaide on May 2, 1941.

##### Dried Human Serum.

In a paper entitled "The Preparation and Use of Dried Human Serum" PROFESSOR A. E. PLATT briefly described the earlier methods used in drying out complex organic substances from solutions, and then gave a more detailed account of those devised by later workers for drying out proteins from the frozen state, making special reference to the method devised by Greaves and Adair at Cambridge.

Professor Platt said that in this method pooled serum was filtered and dispensed in 200-millilitre quantities in 12-ounce MacCartney bottles in which it was frozen by the bottles being placed in a refrigerator at  $-20^{\circ}\text{C}$ . The bottles of frozen serum were then transferred to electrically heated containers in the desiccating plant. Under reduced pressure (0.05 millimetre of mercury) the water vapour "boiled" off from the frozen serum and was condensed on the coils of a refrigeration unit. After three days in the desiccating unit the bottles of dried serum were transferred to another unit where drying was completed by reduction of the atmospheric pressure to 0.001 millimetre of mercury in the presence of  $\text{P}_2\text{O}_5$ . Twenty-four hours later the bottles were filled with dry oxygen-free nitrogen, when they were ready for dispatch.

Serum dried in this way was very stable, even at relatively high temperatures, and was readily soluble. In most cases of surgical shock where blood loss had been small, serum was equally effective as whole blood in relieving the shock.

##### Intraabdominal Pregnancy.

DR. J. B. THIERSCH described a case of intraabdominal pregnancy. This was a case of primary ectopic pregnancy of the abdominal cavity with insertion of the placenta over the descending sigmoid and pouch of Douglas. The chorionic

invasion of the rectal wall brought about perforation and hæmorrhage of the rectum. Later, fecal infection with death of the fetus, and finally general peritonitis of the mother, with subsequent death after five and a half months of pregnancy, took place.

#### Endometrioma of the Colon.

Dr. Thiersch also described a case of endometrioma of the wall of the colon, which was found in a woman suffering from adenomyosis of the uterus. The main theories as to the origin of these lesions were discussed, particularly in the light of the recently advanced knowledge of the physiology and behaviour of the Fallopian tubes.

### Naval, Military and Air Force.

#### APPOINTMENTS.

THE undermentioned appointments, changes *et cetera* have been promulgated in the *Commonwealth of Australia Gazette*, Number 140, of July 17, 1941.

##### AUSTRALIAN IMPERIAL FORCE.

##### Australian Army Medical Corps.

Lieutenant-Colonel D. B. Loudon is appointed to command an Australian Special Hospital, 13th May, 1941.

Major A. W. L. Row is transferred to the Regimental Supernumerary List, 10th April, 1941.

To be Captains.—Captain L. O. S. Poldevin, 1st June, 1941, and Honorary Captains T. W. Miles, 1st June, 1941; and R. R. C. Hayes, 12th June, 1941.

To be Captains.—Honorary Captain E. H. S. Mancy, 1st June, 1941; and Frank Robertson Vincent, 12th June, 1941.

Captain W. Freeborn, M.M., ceases to be seconded in his unit in the Australian Military Forces, 7th July, 1941, and resumes duty in his unit in the Australian Military Forces, 8th July, 1941. Captain H. G. Prest is transferred from "Voyage Only" duties, 30th June, 1941.

Captain D. de la F. Henry is transferred from "Voyage Only" duties, 24th June, 1941.

To be Major (temporarily).—Captain T. J. White, 20th March, 1941.

##### Permanent Supernumerary List.

Lieutenant-Colonel A. C. Thomas is transferred from the Australian Army Medical Corps, 17th May, 1941.

##### AUSTRALIAN MILITARY FORCES.

##### AUSTRALIAN ARMY MEDICAL CORPS.

##### Northern Command.

##### First Military District.

Captain H. S. Walsh is transferred to the Reserve of Officers (A.A.M.C.), 17th June, 1941.

The resignation of Honorary Captain N. T. M. Yeates of his commission is accepted, 8th June, 1941.

To be Honorary Captains.—George Wallace Allan, Roger Burnett Salter, Samuel Gohstand, Leaton Elias, 2nd June, 1941; Robin James Hester Spark, John Joseph Fitzwater, John Albert Emmett, Basil Michael Joseph Conlon, 5th June, 1941; Leslie Thomas Moran, 6th June, 1941; and Harrison Booth Skinner, 10th June, 1941.

##### Eighth Military District.

To be Honorary Captain.—Arthur George Schroeder, 7th June, 1941.

##### Eastern Command.

##### Second Military District.

N75962 Lieutenant W. J. T. Frost, M.B.E., is appointed from the Reserve of Officers and to be Quartermaster, 1st July, 1940.

The following officers are appointed from the Reserve of Officers (A.A.M.C.), and to be Captains (provisionally): Honorary Captains N77775 C. W. Furner, 8th July, 1940; C. P. Jackson, 8th August, 1940; and T. W. Miles, 20th May, 1941.

Captain G. Cummins is appointed from the Reserve of Officers (A.A.M.C.), 26th July, 1940, and to be Major (temporarily), 17th May, 1941.

The appointment of Captain (provisionally) E. F. P. Chin is terminated, 15th April, 1941.



*To be Honorary Major.*—Honorary Captain H. K. Ward, 26th May, 1941.

*To be Honorary Captains.*—Edward Richardson Figtree, 2nd June, 1941; Alexander Robert Scott-Orr, 3rd June, 1941; Charles Ashur Sara, 4th June, 1941; Stephen Graham Mallarky, 5th June, 1941; Nell Acheson Gordon, 7th June, 1941; Alexander William Ross, Ian Donald Russell Gardiner, and Douglas Macdonald Stewart, 10th June, 1941.

#### Southern Command.

##### Third Military District.

Captain (provisionally) N99931 D. C. C. Hinder is transferred from Australian Army Medical Corps, 2nd Military District, 29th April, 1941.

Captain J. Morlet is appointed from the Reserve of Officers (A.A.M.C.), 19th June, 1941.

Honorary Captain E. H. S. Mancy is appointed from the Reserve of Officers (A.A.M.C.), and to be Captain (provisionally), 1st May, 1941.

##### Fourth Military District.

Captain (Honorary Major) H. R. Pomroy is appointed from the Reserve of Officers (A.A.M.C.), and to be Major (temporarily), 3rd September, 1940.

#### Western Command.

##### Seventh Military District.

Captain (Temporary Lieutenant-Colonel) J. B. McElhone is transferred from Australian Army Medical Corps, 2nd Military District, 11th February, 1941.

#### LECTURES ON ARMY MEDICINE IN ADELAIDE.

COLONEL A. R. SOUTHWOOD, Deputy Director of Medical Services of the Fourth Military District, announces that a series of lectures in army medicine will be given at the Institute of Medical and Veterinary Science, Adelaide, on August 10 and 24, 1941. The programme is as follows.

##### Sunday, August 10, 1941.

Morning (10 to 12.30 o'clock).—Major W. John Close: "Combating Venereal Disease in the Army"; Major P. S. Messent: "New Ideas in War Surgery"; Captain M. E. Chinner: "Cerebro-Spinal Fever".  
Afternoon (2 to 4.30 o'clock).—Symposium, "Facio-Maxillary Surgery"—Lieutenant-Colonel Sir Henry Newland, C.B.E., D.S.O.: "The Surgeon's Work"; Captain H. M. Wilson: "Dental Procedures"; Major Gilbert Brown: "Anæsthesia".

##### Sunday, August 24, 1941.

Morning (10 to 12.30 o'clock).—Lieutenant E. R. Cilento: "Physiotherapy at a Camp Hospital"; Major C. B. Sangster: "Hygiene in the Field"; Lieutenant-Colonel G. H. B. Black: "Work of a Field Ambulance".  
Afternoon (2 to 4.30 o'clock).—Captain C. H. Schafer: "Work of a Camp Hospital"; Lieutenant G. F. Patfull: "Army Hospital Equipment and Stores"; Colonel Sir Trent de Crespigny, D.S.O., V.D.: "The Work of a General Hospital in the Field".

Officers of the active and reserve lists of the Australian Army Medical Corps, Fourth Military District, will attend. Members of the Australian Army Nursing Service and senior non-commissioned officers of Australian Army Medical Corps units may attend, and medical practitioners and medical students are invited to be present.

## Correspondence.

### CONTINUOUS SPINAL ANÆSTHESIA.

SIR: The comment made by Dr. Deacon and Dr. Rose shows the important advantage that spinal anæsthesia is prolonged by "Metycaine". I wrote my note on continuous spinal anæsthesia as a country practitioner. From that viewpoint permit me to amplify my communication.

The standard of anæsthesia induced by practitioners is high. Without belittling that expertness, one knows that, when the anæsthesia may be the most important factor in both the completion of the operation and the recovery of the patient, it is best to have the help of a specialist in

anæsthesia. Such a trite statement needs no enlargement here; but I must add that country practitioners seldom have specialist service.

The intrathecal injection of "Novocain", whatever the status of the medical attendant (providing that the physiological processes involved are respected), provides a high plane of anæsthesia. This high plane is an argument in favour of spinal anæsthesia; in addition, "bad risk" patients for inhalation anæsthesia (whether from intrathoracic disease or the nature of the abdominal mischief) are an indication for it. Associated with the procedure there may be three perturbing factors. The first is failure of anæsthesia to last till the completion of the operation. This is countered by Dr. Lemmon's method. The second is failure of the accessory muscles of respiration and of the respiratory centre. This is prevented by the use of a hypobaric solution together with the Trendelenburg position. The third is a fall of blood pressure with cerebral anoxemia. The use of the Trendelenburg position prevents these conditions. From each of several personal communications I am aware that highly successful anæsthesia is induced by hyperbaric solutions; I have avoided these, for if the Trendelenburg position is required early, there may be a danger that the fluid will travel in a cranial direction, and also hypobaric solutions have been satisfactory. That method in which the anæsthetic level is determined by the specific gravity of the anæsthetic solution and the posture of the patient I have thought best left in specialists' hands.

Using local anæsthesia in such work as radical frontal sinus or antrum operations, enucleation of the eye, hemilaryngectomy, partial thyroidectomy, cerebral decompression, Hibb's spinal fusion, Smith-Petersen pinning of the neck of the femur, perineorrhaphy and many other procedures, I have become (in company with other practitioners) confident in and reliant on "Novocain". I am unwilling to relinquish it.

In 452 cases of spinal anæsthesia in which "Novocain" was used, and in 50 cases in which a hypobaric solution of "Percaine" was used, there was one complete failure of anæsthesia with no apparent variation in technique. Seventeen other cases fell approximately into three groups of partial failure. In the first group laparotomy was performed, but there was an immediate return of sensation and muscular reflexes before any intraabdominal manipulation was possible. In the second group the intraabdominal work only was completed. This was a case in which partial gastric exclusion was quietly performed; but there was an abrupt return of rigidity and pain when the retractors were removed. In the third group the central nervous system impulses were blocked, but the sympathetic fibres were unaffected. This was a case in which nephrectomy was quietly carried out except for pain on ligation of the arteries of the pedicle. The effect obtained by means of Kirschner's improved zonal method of spinal anæsthesia<sup>1</sup> has been observed to occur partially with Dr. Lemmon's method, especially after the second injection. This happens occasionally if the needle bevel is directed cranially. Patients are seen to move their legs, while abdominal anæsthesia is perfect. The partial failures in the first two groups of patients should not occur with continuous spinal anæsthesia; to date I have not observed sympathetic nerves escape the anæsthetic.

The following summary represents my conclusions that continuous spinal anæsthesia is a satisfactory and trustworthy procedure.

1. "Novocain" is used; it is (a) boilable, (b) non-toxic in the doses employed, (c) available,<sup>2</sup> (d) inexpensive.
2. The solution is not hyperbaric. It has a specific gravity (1.004) possibly equal to, though usually lower than, that of cerebro-spinal fluid.
3. Premedication is not contraindicated. My patients have one-sixth of a grain of morphine and one one-hundredth of a grain of scopolamine four hours and again one hour before operation.
4. The apparatus is simple; it does not cause a minute's delay in the operation.
5. Anæsthesia is prolonged by repeated injections as required. In a case of subumbilical incisional hernia without a peritoneal sac three hours were taken.
6. No shock, failure to secure continuous anæsthesia, morbidity or death has occurred.

Yours, etc.,

E. A. JOSKE.

Balaklava,  
South Australia,  
July 11, 1941.

#### Reference.

<sup>1</sup>H. Devine: "The Surgery of the Alimentary Canal".

<sup>2</sup>Burroughs Wellcome make a tablet containing adrenaline and 8.75 grains of "Novocain", which is a suitable weight for anæsthesia in one case.

### THE PRACTICAL RESULTS OF IMMUNIZATION AGAINST DIPHTHERIA.

SIR: What immunization can accomplish in combating diphtheria is shown by the remarkable drop in its incidence in Brisbane.

The local authority of Brisbane—the city under review—has an area of 375 square miles and a population of 335,520.

In January, 1938, I decided to make every effort to speed up the Council's free immunization service. I used every available means to impress upon parents the importance of having their children, especially their children of pre-school age, immunized. The response exceeded my most sanguine expectations.

In the three and a half years period, namely, from January, 1938, to June 30, 1941, I have fully immunized 20,053 children. This rate of immunization, which is averaging more than 5,700 *per annum*, is, in the period under review, appreciably in excess of the birth rate. To this must be added an unknown but considerable number of children immunized by private practitioners in Brisbane, and I am pleased to be able to state that, as I write, the response of children is greater than ever.

I am in a position to state that at least 70% of this total are children of pre-school age.

By educative methods the stage has now been reached in Brisbane when the vast majority of parents realize that they owe this simple duty to their children.

The maximum incidence of the disease occurs during the second, third and fourth years of life, and as large numbers of immunized children of this age group are appearing every day in increasing numbers in Brisbane, the incidence of the disease now shows the anticipated spectacular fall.

Here are the figures for this period:

#### Population and Diphtheria Cases.

1938.	1939.	1940.	1941 (6 months).
325,890	326,000	333,560	335,520
459	505	231	127

Diphtheria in recent months has reached epidemic proportions in some cities, but Brisbane, which now has at least 7% of its susceptible child population immunized, is safe from such an eventuality, and with parents cooperating so wholeheartedly with the Council's Department of Health in its sincere attempt to eradicate this serious disease from their midst, a diphtheria-free Brisbane is not far distant.

Yours, etc.,  
RALPH WEAVER,  
Medical Officer of Health.

Town Hall,  
Brisbane,  
July 17, 1941.

### THE SUFFOCATION OF BABIES.

SIR: In the last two years there have been at least five deaths in Sydney from suffocation of babies due to rolling onto the face during sleep.

Surely the cause of these deaths is the present silly fashion of wrapping up babies in blankets with the hands firmly fixed over the chest. This practice not only restricts breathing, but in the case of a baby turning onto its face, it is impossible for the child to get a hand free to allow of an airway to the mouth and nose.

I have heard nurses say that it prevents hand sucking (a pretty harmless habit) or that it prevents the hands getting cold; if long sleeves are worn the exposure of the hands is of no more consequence than the exposure of the face, yet, so far, no attempts have been made to make the baby wear a warm mask.

Abandonment of this "mummy wrapping" would mean the prevention of this type of tragedy.

Yours, etc.,  
"PREVENTION."

July 23, 1941.

### A WARNING TO USERS OF DIATHERMY APPARATUS.

SIR: I think that, in the interests of the medical profession and of the public, the following information should be circulated as widely as possible throughout the medical profession, and I should, therefore, be glad if you would publish this letter in your journal.

The recent introduction of earthed metal screens around diathermy apparatus in accordance with a regulation pub-

lished under the *National Security Act*, has brought to light a dangerous condition in certain diathermy apparatus which has already caused the death of one patient from electric shock. This particular accident occurred in Brisbane, but it has been found that units of a similar type are in use in Sydney and, presumably, in all cities.

The type of diathermy apparatus in question is that which includes a spark gap. A check of two such units used in Sydney revealed the existence of dangerous conditions which, however, were easily rectified without interfering with the operation of the machines. Although these machines had been in use for many years without misadventure, the introduction of the earthed metal screen made the likelihood of accident very much greater.

It is therefore suggested that any medical practitioner who is using a diathermy machine of the spark gap type should immediately consult the body supplying his installation with electricity, so that his machine may be checked and he may be informed of any adjustments necessary to make it safe.

In the city of Sydney the supply authority mainly concerned is the Sydney County Council, whose Installation Inspection Branch can be reached by telephoning M 4407, extension number 234.

For those who may be interested from the electrical point of view, it should be mentioned that the dangerous conditions arose because, in the transformer, both the primary and secondary windings were connected at one end to the transformer core, with the result that if this end of the windings were the active end, the treatment table and possibly certain projecting bolts on the transformer cabinet would be raised to a potential of approximately 240 volts above earth.

Yours, etc.,  
R. VINE-HALL,  
General Manager.

The Sydney County Council,  
Electricity Undertaking,  
Queen Victoria Building,  
457-479, George Street,  
Sydney.  
July 24, 1941.

### MEDICAL WAR RELIEF FUND.

THE following is a thirteenth list of contributions to the Medical War Relief Fund established by the Federal Council of the British Medical Association in Australia for the relief of distressed medical practitioners in Great Britain.

#### Victoria.

- £21: Sir Alan Newton.  
£10 10s.: Dr. F. Blois Lawton, Dr. H. F. Maudsley, Dr. Balcombe Quick.  
£10: Dr. H. M. L. Murray.  
£5 5s.: Dr. Dougan Bird, Dr. S. G. L. Catchlove, Dr. F. F. D'Arcy, Dr. A. I. Green, Dr. Eileen M. Higgins, Dr. R. Howden, Dr. Thomas King, Dr. Leonard J. Mitchell, Dr. A. T. Murray, Dr. D. G. Stewart, Dr. Effie Stillwell, Dr. J. T. Tait, Dr. A. J. Trinca, Dr. R. Webster, Dr. A. E. Rowden White.  
£5: Dr. V. C. Brown, Dr. K. E. Ratten, Dr. S. J. Reed, Dr. Laura Weir, Dr. Barbara G. Wood.  
£3 3s.: "Anonymous, Gippsland", Dr. E. Danby, Dr. Helen Kelsey, Dr. Kate MacKay, Dr. J. Newman Morris, Dr. F. Xipell.  
£2 2s.: Dr. W. J. Allen, Dr. Cecil Cantor, Dr. J. C. Catarinich, Dr. J. H. Colebatch, Dr. F. E. Cox, Dr. A. L. Cunningham, Dr. M. C. Davis, Dr. J. Bell Ferguson, Dr. W. H. Fitchett, Dr. J. P. Horgan, Dr. W. A. Kemp, Dr. I. J. Paull, Dr. R. G. Penington, Dr. C. H. Prouse, Dr. Noel Pryde, Dr. D. B. Rosenthal, Dr. E. R. Sawrey, Dr. C. J. Tonkin, Dr. F. T. Wheatland, Dr. I. J. Weyman, Dr. I. G. Wynne, Dr. D. Yoffa, Dr. Isaac Yoffa.  
£1 1s.: Dr. B. D. Fethers, Dr. Alan J. M. Nelson.  
£1: Dr. E. K. Rule.  
10s. 6d.: Dr. G. M. Oxer.

#### South Australia.

- £10 10s.: Western Clinic.  
£5 5s.: Dr. G. Brown and Dr. Marie Brown (joint contribution), Dr. H. A. McCoy, Dr. J. W. Clayton, Dr. G. N. Lorimer and Dr. C. King (last two, joint contribution).  
£3 3s.: Dr. B. E. Wurm, Dr. J. Andrews, Dr. J. R. Cornish, Dr. R. A. Haste, Dr. L. J. T. Pellew.  
£1 10s.: Dr. A. T. Harbison (second donation), Dr. A. R. Clayton (second donation).  
£1 1s.: Dr. A. Sandison, Dr. K. J. Basedow, Dr. H. R. H. N. Oaten.

**Western Australia.**

£5 5s.: Dr. A. Juett and Dr. R. D. McKellar Hall (joint contribution).  
£2 2s.: Dr. M. A. Mayrhofer.  
£1 1s.: Dr. T. L. Anderson.

**NOTICE.**

THE next meeting of the medical board of the Royal Prince Alfred Hospital will be held on Wednesday, August 13, 1941, in the A2 lecture theatre. The clinical section will last approximately one hour and will commence at 4.30 p.m. The professional units will give a demonstration. All medical practitioners are invited to be present.

**Obituary.****ARCHIBALD JENKINS.**

WE regret to announce the death of Dr. Archibald Jenkins, which occurred on July 22, 1941, at Harbord, New South Wales.

**ALEXANDER CHRISTIE McARTHUR.**

WE regret to announce the death of Dr. Alexander Christie McArthur, which occurred on July 21, 1941, at Ryde, New South Wales.

**SAMUEL ARTHUR EWING.**

WE regret to announce the death of Dr. Samuel Arthur Ewing, which occurred on July 24, 1941, at Melbourne, Victoria.

**Australian Medical Board Proceedings.****QUEENSLAND.**

THE undermentioned have been registered, pursuant to the provisions of *The Medical Act, 1939*, of Queensland, as duly qualified medical practitioners:

Alexander, William John Heriot, M.B., B.S., 1939 (Univ. Melbourne), General Hospital, Rockhampton.  
Rowe, Harold John, M.B., B.S., 1940 (Univ. Melbourne), General Hospital, Brisbane.

**TASMANIA.**

THE undermentioned have been registered, pursuant to the provisions of *The Medical Act, 1918*, of Tasmania, as duly qualified medical practitioners:

Rosenthal, Warwick, M.B., B.S., 1941 (Univ. Melbourne), Public Hospital, Launceston.  
Kelly, Jean Mercy, M.B., B.S., 1939 (Univ. Melbourne), Hobart.

**Medical Appointments.**

Dr. Hugh Gilmour Wallace has been appointed Deputy Director-General of Public Health, Director of the Division of Tuberculosis and Senior Medical Officer of Health of New South Wales.

Dr. Francis Stephen Bonar has been appointed Government Medical Officer at Wilcannia, New South Wales.

Dr. Clive Lansdell Paine has been appointed Government Medical Officer at Atherton, Queensland.

Dr. Geoffrey Hardman Howard has been appointed Deputy Superintendent, Northfield Mental Hospital, South Australia.

Dr. Harry Milton Southwood has been appointed Deputy Superintendent, Enfield Receiving House, South Australia.

Dr. Robert Dunlop Goldie has been appointed Government Medical Officer at Wollongong, New South Wales.

**Books Received.**

"Vitamins, What They Are and How They Can Benefit You", by H. Borsook, Ph.D., M.D.; 1941. New York: The Viking Press; Sydney: Angus and Robertson Limited. Demy 8vo, pp. 225. Price 12s. 6d.

"Principles and Practice of Aviation Medicine", by H. G. Armstrong, B.S., M.S., M.D.; 1939. Baltimore: The Williams and Wilkins Company; Sydney: Angus and Robertson Limited. Medium 8vo, pp. 508, with illustrations and diagrams. Price: 52s. net.

**Diary for the Month.**

- AUG. 5.—New South Wales Branch, B.M.A.: Organization and Science Committee.  
AUG. 6.—Victorian Branch, B.M.A.: Branch.  
AUG. 6.—Western Australian Branch, B.M.A.: Council.  
AUG. 7.—South Australian Branch, B.M.A.: Council.  
AUG. 8.—Queensland Branch, B.M.A.: Council.  
AUG. 8.—Victorian Branch, B.M.A.: Legislation Subcommittee.  
AUG. 12.—Tasmanian Branch, B.M.A.: Branch.  
AUG. 12.—New South Wales Branch, B.M.A.: Executive and Finance Committee.  
AUG. 14.—Victorian Branch, B.M.A.: Ethics Subcommittee.  
AUG. 18.—Victorian Branch, B.M.A.: Hospital Subcommittee.

**Medical Appointments: Important Notice.**

MEDICAL PRACTITIONERS are requested not to apply for any appointment mentioned below without having first communicated with the Honorary Secretary of the Branch concerned, or with the Medical Secretary of the British Medical Association, Tavistock Square, London, W.C.1.

**New South Wales Branch** (Honorary Secretary, 135, Macquarie Street, Sydney): Australian Natives' Association; Ashfield and District United Friendly Societies' Dispensary; Balmmain United Friendly Societies' Dispensary; Leichhardt and Petersham United Friendly Societies' Dispensary; Manchester Unity Medical and Dispensing Institute, Oxford Street, Sydney; North Sydney Friendly Societies' Dispensary Limited; People's Prudential Assurance Company Limited; Phoenix Mutual Provident Society.

**Victorian Branch** (Honorary Secretary, Medical Society Hall, East Melbourne): Associated Medical Services Limited; all Institutes or Medical Dispensaries; Australian Prudential Association, Proprietary, Limited; Federated Mutual Medical Benefit Society; Mutual National Provident Club; National Provident Association; Hospital or other appointments outside Victoria.

**Queensland Branch** (Honorary Secretary, B.M.A. House, 225, Wickham Terrace, Brisbane, B.17): Brisbane Associated Friendly Societies' Medical Institute; Bundaberg Medical Institute. Members accepting LODGE appointments and those desiring to accept appointments to any COUNTRY HOSPITAL or position outside Australia are advised, in their own interests, to submit a copy of their Agreement to the Council before signing.

**South Australian Branch** (Honorary Secretary, 173, North Terrace, Adelaide): All Lodge appointments in South Australia; all Contract Practice appointments in South Australia.

**Western Australian Branch** (Honorary Secretary, 205, Saint George's Terrace, Perth): Wiluna Hospital; all Contract Practice appointments in Western Australia.

**Editorial Notices.**

MANUSCRIPTS forwarded to the office of this journal cannot under any circumstances be returned. Original articles forwarded for publication are understood to be offered to THE MEDICAL JOURNAL OF AUSTRALIA alone, unless the contrary be stated.

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**SUBSCRIPTION RATES.**—Medical students and others not receiving THE MEDICAL JOURNAL OF AUSTRALIA in virtue of membership of the Branches of the British Medical Association in the Commonwealth can become subscribers to the journal by applying to the Manager or through the usual agents and book-sellers. Subscriptions can commence at the beginning of any quarter and are renewable on December 31. The rates are £2 for Australia and £2 5s. abroad per annum payable in advance.